

A Report on Conflict between Mining and Special Protected Areas in Mongolia with Models for Conflict Resolution from the United States, Canada, and Australia

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Note on Terminology

At the present time there are no standard international equivalents for the terms "Mineral License," "Exploration License," and "Mining License" used in the English translation of the *Minerals Law of Mongolia*. Each country, and sometimes each province in a country, uses slightly different but interchangeable terms for these concepts. Throughout the report that follows, the mineral license terminology used will shift with the country being discussed, and sometimes terminologies of different countries are mixed when mining policies are discussed collectively. In order to clarify this situation, Appendix A has been included to cross reference international mineral license terms with their approximate Mongolian equivalents. Following is a list of terms that are sometimes used interchangeably throughout the report, but which collectively indicate mineral exploration and mining activities and the locations where these activities are occurring.

- mineral licenses
- mineral claims
- mineral activities
- mineral leases
- claims
- exploration licenses
- exploration activities
- extraction licenses
- extraction activities
- licenses
- license areas
- mining
- mining activities
- mining operations
- mining licenses
- mine sites

Introduction

Mongolia has what is arguably the world's longest tradition of environmental protection dating back to the 13th century "Ikh Zasag" code of Chingis Khan. This code of law forbade, among other things, the pollution of water and the destruction of soil, the protection of both resources being critical in the pastoral-centric steppe empire (Ref. 1 and 2). Mongolia also has what is the world's oldest tradition of establishing protected areas, dating back to 1778 when the world's first protected area was declared at Bogdkhan Mountain, where all hunting and logging were banned. In 1818, Otgontenger and Bulgan Mountains become Mongolia's second and third protected areas (Ref. 3).

Present day Mongolia is uniquely situated at the convergence of the Gobi Desert, Central Asian Steppe, and Siberian Forest biogeographic regions. Because Mongolia's national borders enclose all three of these major Central Asian ecological zones, Mongolia has what may be the highest biodiversity of any of the Central Asian nations. Continued preservation of Mongolia's biodiversity is important not only for Mongolia, but for the ecological heritage of all of Central Asia, since Mongolian species may be needed to repopulate flora and fauna that have become locally extinct in other parts of the region. Such species include the world's only population of Gobi bears, the world's last free roaming populations of wild bactrian camels and takhi horses, as well as large populations of snow leopards and other threatened mammals, birds, and fish (Ref. 4). The need to preserve Mongolia's biodiversity has been recognized by the national government and led Mongolia's delegation to the 1992 United Nations *Conference on Development and Environment* in Rio de Janeiro to propose that the entire nation of Mongolia be declared a biosphere reserve (Ref. 5). Although in subsequent years a more pragmatic approach to biodiversity conservation has emerged, Mongolia has remained committed to becoming a global model for nature conservation, particularly through its present program to more than double the size of the nation's special protected area system.

Mongolia has created new special protected areas incrementally since 1950. However, with the introduction of a democratic system of government in 1990, the rate at which new special protected areas have been added to Mongolia's reserve system has accelerated rapidly. Since 1992, the total number and area of Mongolia's special protected areas has increased from 19 areas covering 12.6 million ha, or 5.6% of national territory, to 48 areas covering 20.5 million ha, or 13.1% of national territory (Ref. 5 and 3). It is planned to further increase the total area of Mongolia's special protected areas to 30% of national territory before the year 2030 (Ref. 3).

Mongolia's low population density and traditional nomadic herding economy have no doubt played a large part in preserving high levels of biodiversity until the present day. However, in direct conflict with the campaign to preserve Mongolia's unusually high biodiversity through an extensive network of special protected areas and their buffer zones is the simultaneous rapid expansion of Mongolia's mining industry. Following the break up of the Soviet Union and collapse of the Soviet Bloc markets for Mongolia's animal products industries, mining has become Mongolia's most reliable source of

income. Today, mining in Mongolia annually accounts for approximately 13% of gross national product (Ref. 6). Even without considering gold production, which is sold directly to the Mongolian central bank, mining accounts for about 40% of foreign export earnings (Ref. 6). The single open pit copper mine at Erdenet by itself accounts for about 33% of foreign export earnings annually (Ref. 6). With Mongolia's foreign debt already at 75% of gross national product and growing yearly, mineral exports will continue to be one of the nation's most important sources of revenue for decades to come (Ref. 7). The government of Mongolia actively sends representatives to international mining trade fairs to encourage foreign mining companies to set up operations in Mongolia, and today mineral exploration and extraction licenses cover about 11% of Mongolia's national territory (Ref. 8).

However, the present rapid push to exploit mineral wealth throughout the whole of Mongolia provides a new threat to Mongolia's high levels of biodiversity. Ironically, the same vast mountainous landscapes that have been refuges for disappearing Central Asian flora and fauna for centuries, and which provide the backdrop to some of Mongolia's most spectacularly scenic special protected areas, are also treasure troves of largely unexplored mineral wealth. With the simultaneous rapid expansion of both Mongolia's system of special protected areas and Mongolia's mining industry, conflicts over land use will inevitably arise.

From the experiences of Australia, Canada, and the United States, it is generally agreed that mining activities are largely incompatible with the goals of special protected area systems worldwide of preserving flora, fauna, landscapes, cultural features and other environmental resources for future generations. Thus it will be increasingly necessary to balance the financial needs of Mongolia that are met by mining with the need to preserve Mongolia's natural heritage for future generations of Mongolians. Long after Mongolia's mineral wealth has been exhausted, Mongolia's special protected areas could be a reliable source of income from ecotourism for people living at and along the routes to protected areas. While the mining vs. special protected areas debate is a relatively new topic in Mongolia; the United States, Canada, and Australia have a long history of addressing this issue, dating back to the creation of the first national park in these nations at Yellowstone in 1872.

The following report will briefly discuss the special protected area systems of the United States, Canada, and Australia, and then examine how each of these three countries deals with the conflicts between their protected area systems and mining, as illustrated with three high profile case studies. This analysis of mining and protected area policy will be followed by a discussion of the applicability of the models from these 3 nations to resolving conflicts between the mining industry and special protected areas in Mongolia. Many cases which parallel the development and execution these policies exist and will continue to arise in Mongolia, and it is hoped that the information contained in this report will provide assistance in forming a sound policy for resolving conflicts between Mongolia's protected areas and its mining industry. In addition to presenting current information on these issues, this report should also be viewed as a resource for further investigation of this subject, particularly via the internet (see reference list).

Part 1: The United States

1.1 United States Special Protected Areas

In the United States there are many categories of special protected areas administered by a variety of agencies at both the national and state levels. At the national level the 3 main groups of federal special protected areas are the National Parks, National Wilderness Areas, and National Wildlife Refuges, while at the state level each state administers a state park system and sometimes a state forest system.

1.1.1 American National Parks

America's National Park System focuses on preserving areas of exceptional scenic beauty, pristine wilderness, and natural wonders, the three most famous examples of which are the Grand Canyon, the geysers of Yellowstone, and the granite cliffs of Yosemite Valley. While the national parks are managed to preserve dramatic natural landscapes, habitat for rare wildlife and plants, as well as threatened ecosystems, the parks are also managed for intensive recreation and include zones which are easily accessible to the public. In contrast to park areas designated as wilderness, which are only accessible by foot or pack animal, national park villages are easily accessible by tour buses and include campgrounds, hotels, and shops. The National Park System also includes areas of important cultural and historic value, such as the ruins of the ancient Anasazi Civilization in the Four Corners region of the American southwest. Other special protected area categories managed under the National Park System include National Monuments (which tend to be areas of important natural, cultural, and historic value but of smaller areal extent than National Parks), National Seashores, National Wild and Scenic Rivers, and other types of nature reserve designations. The National Park System is administered by the National Park Service, which oversees 33.2 million ha of park land, or roughly 4% of America's national territory (Table 1, Map 1).

1.1.2 National Wilderness Areas

America's National Wilderness Preservation System was established in 1964 by an act of Congress to preserve landscapes in a natural state, undisturbed by man for future generations to enjoy. These areas have not been, and are not intended to be developed in any form or manner beyond foot trails, and often have features of ecological, geological, scientific, scenic, and historic significance that are protected by their designation. Construction of permanent roads and structures is prohibited in these areas, as are public events such as sport competitions, commercial activities, motor vehicles, and even radios and bicycles. Wilderness areas are intended to be places where man can find solitude and a temporary refuge from the modern world, but also to be places where man is only a short term visitor, not a permanent resident and modifier of the landscape. Because of the lack of human impacts on these areas, they generally have outstanding value as wildlife habitat for rare and threatened species. National Wilderness Areas have been designated on National Park, National Wildlife Refuge, National Forest, and Bureau of Land Management (BLM) lands, and are managed by the 4 respective administering agencies as guided by the common mission and goals of the 1964 *Wilderness Act* (Ref. 25). The total area of land designated as national wilderness in the United States is 42.1 million ha, or about 5% of national territory (Table 1).

1.1.3 National Wildlife Refuges

America's National Wildlife Refuge System was created in 1966 by an act of Congress in order to preserve wildlife, fish, plants, and their habitats for present and future generations of Americans (Ref. 30). In contrast to National Parks and Wilderness Areas, which seek to provide unspoiled natural reserves for access by humans, the National Wildlife Refuge System seeks to provide undisturbed natural surroundings for the benefit of wild creatures. The goals of the National Wildlife Refuge System include:

- Preservation and improvement of all threatened and endangered plant and animal species in their natural environment.
- Protection and perpetuation of migratory bird species and their flyways.
- Preservation of natural diversity and abundance of fauna and flora on refuge lands (Ref. 31).

The National Wildlife Refuge System also seeks to provide man with an understanding and appreciation of fish and wildlife ecology, and the human impacts on both. While recreational activities are permitted in wildlife refuges, these activities must be compatible with the wildlife protection goals of the refuge system. The National Wildlife Refuge System is administered by the U.S. Fish and Wildlife Service and includes 36.8 million ha of land, or about 4% of national territory (Table 1).

1.1.4 National Forests and BLM Lands

Other federally administered lands which have a multiple use mandate but which include areas with fully protected status are the National Forests (81 million ha, or 9% of national territory) and Bureau of Land Management (BLM) lands (107 million ha, or 13% of national territory). In fact 38% of the fully protected National Wilderness Preservation System falls on these lands (Table 1, Maps 1 and 2). The U.S. Forest Service administers America's National Forests and National Grasslands with the mission of protecting, conserving, and managing these lands in a sustainable manner in order to achieve multiple use objectives. These objectives include: timber production, watershed management, rangeland management, wildlife conservation, rural economic development, improvement of scientific knowledge of forests and rangelands, as well as preservation of the wilderness, cultural, and recreation values of these lands (Ref. 35). The Bureau of Land Management manages BLM lands according to a mission similar to that of the National Forest Service. However, while the National Forest System has an overriding emphasis on timber management, BLM lands are dominated by rangelands, and thus the BLM has a range management emphasis. Both agencies are guided by a common principle of managing lands to derive the maximum long term benefit for the American people through a sustainable, multiple use management approach.

1.1.5 State Park Systems

In addition to America's federal special protected areas, most American states have extensive state park systems which are protected for the same reasons as the National Parks, Wilderness Areas, and Wildlife Refuges. These areas are generally smaller in areal extent than federal protected areas, but like the national parks are usually managed for nature conservation and recreation. For example the state of California has over 260

State Parks, covering a total area of 526,000 ha (Ref. 41). California's State Park System includes the following designations: underwater reserves and parks; redwood, rhododendron, and wildlife reserves; state beaches, recreation areas, wilderness areas, historic parks, historic homes, cultural reserves, lighthouses, and ghost towns. Mining activities, apart from limited recreational gold panning restricted to specific state historical parks, is generally prohibited.

Table 1. United States Federal Special Protected Areas

Division	Number of Units	% of Federal Land Managed	% of National Territory Managed	Area (hectares)	% of National Wilderness System Managed
National Parks	51 Parks, Over 300 National Monuments and Nature Reserves	13	4	33,200,000	42
National Forests and Grasslands	155 Forests 20 Grasslands	30	9	80,900,000	33
BLM Lands		42	13	106,800,000	5
National Wildlife Refuges	520	15	4	36,800,000	20
Totals		100	30	257,800,000	100
National Wilderness System	628	16	5	42,100,000	

Sources: Ref. 24, 35, 36, and 37.

1.2 Establishing Mineral Rights on Public Lands in the U.S.A.

Before beginning the discussion of conflicts between mining and special protected areas in the United States, it is first necessary to briefly describe the process by which mineral rights are established on American federal lands open to mining. The regulations

concerning mineral exploration and extraction on federal lands in the United States are complex, and vary with the type of mineral commodity involved. The three categories used for mineral commodities found on U.S. federal lands are:

- Locatable Minerals - which are valuable metallic and non-metallic mineral substances such as gold, silver, copper, tin, gypsum, and flourspar. Ownership of locatable minerals discovered on federal lands open to mining is granted directly to the discoverer.
- Leasable Minerals - which include oil, gas, and coal. Ownership of leasable minerals discovered on all federal lands is retained by the federal government, which charges land rental fees for the deposit site and also a royalty on production of these commodities. One notable distinction between leasable and locatable minerals is that deposits of leasable minerals generally occupy much larger land areas than locatable minerals.
- Salable Minerals - which include sand, stone, gravel, and pumice. Salable minerals found on federal lands open to mining can only be acquired from the federal government by direct purchase.

The 1872 *Mining Law* grants the discoverer of a locatable mineral deposit on federal lands open to mining the exclusive right to develop that deposit (Ref. 39). The process of establishing the right to a mineral deposit for the public record is called "claim staking," a procedure that has changed little since passage of the 1872 mining law. "Claim staking" is initiated by simply placing stakes in the ground to delineate the approximate surface boundaries of a known deposit, and is completed by filing a description of the deposit location, the date of its discovery, and the personal information of the discoverer with the appropriate local and federal agencies. It is specifically prohibited to stake and file a claim if a commercially valuable mineral deposit has not been found on the claim site, as rights to locatable minerals only begin with discovery. Thus a mineral "claim" in American terminology is analogous to a mining license area in the Mongolian system (see Appendix A, section 4.2).

However, because of the need to protect rights to a mineral claim prior to discovery of a valuable mineral deposit, which in Mongolia are protected by the issuance of an exploration license, an area that is under exploration for locatable minerals may be staked as a claim by a prospector. Once staked, it is tacitly understood that prior to actual discovery of a mineral deposit, all rights to the claim under exploration are held exclusively by the prospector, provided that the prospector continuously occupies the claim site and conducts exploration work until a discovery is made.

Registered locatable mineral claims may be occupied indefinitely provided that the claim holder performs at least \$100 worth of development work on the claim annually. While permission is not needed for non-surface disturbing entry onto federal lands open to mining, operation plans must be submitted to and permits obtained from the relevant government agencies for all surface disturbing exploration and extraction work (Ref. 18).

1.3 Mining and United States Federal Special Protected Areas

For National Parks (including National Monuments, National Wild and Scenic Rivers and other nature reserve designations), National Wilderness Areas, and National Wildlife Refuges, the United States Congress has decided that the scenic, recreational, biologic, ecological, historic, and cultural values of these sites in their natural undisturbed state have more value to the nation and humanity than could be obtained through their development for minerals and other natural resources. Thus federal special protected areas have been placed off limits to all new mineral exploration and extraction in perpetuity. In conformance with the goals for which a protected area is created, it is intended that all mining activity begun in the declared protected area prior to its designation will cease, all mine claims in the protected area will be relinquished, no further mine claims will be made in the area, and that no future mining will occur in the area. In intent, special protected area designation in the United States terminates all mineral exploration and extraction activities in the area. While simple in principle, in practice eliminating preexisting mineral claims from protected areas involves many legal complexities. In order to achieve the goals of special protected area designation, each federal agency managing protected areas has varying policies and approaches to eliminating mining activities on its protected lands. The following sections will examine how the conflict between mining activities and special protected areas is dealt with in each type of American protected area.

1.3.1 American National Park System Mining Policy

The mandate of the National Park Service is to "aggressively" conserve and protect America's natural and historic wonders in their pristine state for all future generations. Mining is an activity that is clearly at odds with this mission. In 1976 the *Mining in the Parks Act* closed the entire National Park System to location of new mining claims (Ref. 19). As of 1997 there were only 32 remaining mining operations located in just 17 national park units out of a total of over 350 units (Ref. 20).

However, the park service is obligated by law to respect relict mining claims within park boundaries that existed prior to either creation of the park or passage of the *Mining in the Parks Act*. But the act also granted all regulatory responsibilities concerning mining activities in national parks to the National Park Service. Thus in order to minimize damage to park values and purposes, the National Park Service can legally hold mine operations within national parks to far higher and more rigorously enforced environmental protection standards than would be required on unprotected lands. Present National Park Service environmental protection regulations for relict mining activities within park boundaries include:

- Required permits for access to mine sites, except by foot or pack animal.
- An annual assessment report to prevent forfeiture of mineral claims.
- Park approval of all new buildings and structures.

- A plan of operations including rigorous environmental protection measures that must be approved by the park service before a mine operation can begin.
- Implementation of additional environmental protection standards as mandated by the park service when the need arises.
- Frequent unannounced mine inspections.
- Posting of a reclamation bond equal to *at least* the entire cost of reclaiming the site.
- Requirement that a mine site be returned to its *pristine* condition.
- Required permits for water use.
- A general expectation that a mine will not be detrimental to the mission of the park through excess noise, air, or water pollution, soil contamination, night lighting, or damage to scenic and wildlife habitat values of the land (Ref. 21).

Many relict claims within national parks will not be developed due to mining becoming unfeasible as a result of park designation. This can occur because it is prohibited to build the infrastructure necessary to service the mine across park lands, the mine becomes economically unviable because the environmental protection standards required by the park service are too costly, or because negative public opinion forces cessation of a mining activity within a park. Thus some undeveloped or disused claims may be voluntarily forfeited and revert to park control. In the event that no level of mineral development in a park is acceptable due to environmental sensitivities or significant public disapproval, Congress may authorize funds to buy mine claims within a park at a fair price so that the claim area will revert to fully protected status. Likewise, Congress may authorize a land trade giving the mining concern a mine claim of equivalent value on unprotected federal lands in exchange for the claim area within a park.

1.3.2 American National Park System Buffer Zones and Mining

In addition to actively working to protect all lands within park boundaries, the National Park Service also actively works to protect lands in buffer zones *adjacent* to parks, as in the case of the New World Mine next to Yellowstone National Park (see case study). Environmental problems affecting parks due to mines in park buffer zones include:

- Introduction of exotic plant species.
- Reduction of important wildlife habitat.
- Displacement of wildlife.
- Visual intrusion and damage to scenic values of a park.
- Impairment of views of night skies through excessive night lighting.
- Excessive noise and noxious odors.
- Reduction of air quality due to airborne pollutants or fugitive dust.
- Danger to visitor safety from air and water borne contaminants and other physical dangers such as mine shafts and unstable tailing piles.
- Overall degradation of the visitor's experience (Ref. 22).

Not the least important factor of which is the overall degradation of the visitor's experience by intrusive mine impacts. In order to protect degradation of a park's natural and cultural resources from mineral development in park buffer zones, the National Park

Service actively studies mineral development proposals on these lands. Through early intervention, the park service attempts to protect park interests by coordinating planning of these mineral developments with managers of adjacent buffer zone lands so that these activities do not occur in areas which are visible from the park, or in areas where the park environment is adversely affected.

1.3.3 National Wilderness Preservation System Mining Policy

Unlike the National Park and Wildlife Refuge Systems, the National Wilderness Preservation System is an interagency system, and thus is managed cooperatively by 4 federal agencies according to the goals of the 1964 *Wilderness Act* (Ref. 25). Obviously, mineral exploration and development activities are incompatible with the objective of the National Wilderness Preservation System to preserve vast tracts of land in a wild state unaltered by man. Regardless of the mission of the agency administering wilderness areas under its jurisdiction, meeting the objectives of the 1964 *Wilderness Act* is given highest priority, though adjacent buffer zone areas will be managed according to the varying missions of the respective administering agencies. Individual agencies may also implement agency specific goals in their wilderness management practices.

By the 1964 *Wilderness Act*, all new mineral exploration and extraction activities in wilderness areas declared on the day the act was ratified (September 3, 1964) have been prohibited since December 31, 1983. Wilderness areas designated after September 3, 1964 are closed to all new mining exploration and extraction activities that can not show proof of discovery prior to their designation as wilderness by Congress. For mining claims that were registered prior to a wilderness area being closed to mining on either December 31, 1983 or the date the area was designated a wilderness area by Congress, the federal government respects the right to develop the mining claim provided that the administering agency reviews the plan of operation, and confirms that the goals of the Wilderness Preservation System can be met in spite of the mining activity (Ref. 25).

Thus in wilderness areas, as in the national parks, mines are only permitted to operate if they can meet the highest standards for environmental protection. For example, the National Park Service guidelines for mines operating in designated national park wilderness areas include requirements to guarantee that short and long term impacts of mining operations on park wilderness areas are unnoticeable, and may require but are not limited to:

- Sound barriers.
- Camouflage.
- Camping platforms.
- Reducing operations to certain times of the day or year.
- Limiting night lighting.
- Hauling out all greywater or other wastes.
- Restoration of natural ecological conditions and processes (Ref. 26).

During operation of mines, Bureau of Land Management (BLM) wilderness management guidelines require mine operators to prevent:

- Soil erosion.
- Deterioration of the land.
- Impairment of wilderness characteristics.
- Obstruction, pollution, or siltation of streams, lakes, and springs (Ref. 27).

Guidelines for mine reclamation in BLM managed wilderness areas require mine operators to:

- Begin reclamation within 6 months after a mining operation finishes.
- Finish reclamation within a reasonable amount of time as determined by the BLM, generally one year.
- Remove all roads, structures, and facilities.
- Satisfactorily revegetate the mine site.
- Create natural looking land surface contours (Ref. 27).

During mineral exploration in wilderness areas, US Forest Service guidelines state that exploration activities must not cause significant surface disturbance in search of indirect evidence or indications of mineral resources, and do not permit use of motorized or mechanical equipment unless special conditions cited in the *Wilderness Act* are met (Ref. 28). In all cases mineral exploration activities within wilderness areas must be conducted in a manner that preserves the wilderness environment. Like minerals, timber, water, or wildlife, the U.S. Government views wilderness as a natural resource which is not necessarily renewable, and which must be conserved, protected, and managed.

While all four managing agencies have strict operational guidelines for mining activities which have a legal right to operate in National Wilderness Areas, each agency still seeks to discourage mining activities on the wilderness lands it manages. National Park Service policy concerning wilderness areas it manages clearly states that the park service will attempt to eliminate all valid mining claims and nonfederal mineral interests in national park wilderness areas through acquisition. The National Park Service also subscribes to the view that "lands subject to mineral exploration and development should be recommended for wilderness (designation) only if it is likely the mineral rights will be relinquished, acquired, exchanged, or otherwise eliminated in the foreseeable future" (Ref. 29). U.S. Forest Service policy on non-federal lands in wilderness areas is "whenever and wherever possible, acquire non-federal lands located within wildernesses (including mineral claims), as well as non-federal lands within those areas *recommended* for inclusion in the (wilderness) system" (Ref. 28).

1.3.4 National Wildlife Refuge System Mining Policy

Mining is arguably the single activity which is most incompatible with the mission of the National Wildlife Refuge System to preserve lands and ecosystems in a natural state for the benefit of fish and wildlife. The noise alone from mine machinery and blasting would be sufficient to clear smaller refuges of wildlife, but the increased potential for air, water, and soil contamination from mining operations also pose severe threats to the goals for which wildlife refuges are created.

Upon their creation, the National Parks and National Wilderness Areas have complete prohibitions on new mining claims. However, for National Wildlife Refuges the U.S. Secretary of the Interior has the power to authorize mining activities on refuge lands. Although the authority to open refuge lands to mining exists, new mining activities in refuges are rare exceptions rather than the rule, and the U.S. Fish and Wildlife Service almost categorically recommends that no new mining be authorized except in unusual circumstances. In fact, in 1984, the Secretary of the Interior ordered that no new leasing of federally owned oil, gas, or minerals occur on acquired refuge lands outside Alaska except to protect the government's interest, for example draining refuge oil off-refuge to improve wildlife habitat (Ref. 32). Of the 520 extant National Wildlife Refuges, only eleven refuges reported having active mining operations in 1994. Nine of the eleven were in Alaska and the remaining two were in Arizona (Ref. 32).

Nevertheless, preexisting mineral claims located on refuge lands extant prior to their designation as National Wildlife Refuges are respected by law. Although preexisting claims are respected, the 1966 *National Wildlife Refuge Administration Act* authorized the U.S. Fish and Wildlife Service to regulate all mining operations on wildlife refuge lands to ensure that the exercise of valid mineral rights is compatible with the purposes for which the refuge was established (Ref. 30). Thus all mineral development in wildlife refuges is conducted in accordance with federal laws and regulations for the protection of wildlife and wildlife refuges. The objectives of the U.S. Fish and Wildlife Service in management of minerals in National Wildlife Refuges are to:

- Protect wildlife populations, habitat, archeological resources, and natural landscapes.
- Integrate any development and use of valid mineral rights with the proper use, conservation, and administration of wildlife resources on refuge lands by minimizing to the fullest extent possible disturbance or damage caused by mining activities.
- Ensure all mined refuge lands are reclaimed to restore their productivity and usefulness in sustaining wildlife.
- Prevent illegal mining activities or operations on refuge lands (Ref. 33).

Thus like the national parks and wilderness areas, development of mineral claims in wildlife refuges is bound to far higher environmental standards than on unprotected lands, and the U.S. Fish and Wildlife Service has authority to require that mining operations under its jurisdiction implement rigorous environmental protection measures. Such environmental protection measures include:

- Requiring mine operators to follow the least damaging route to their claim as specified by the U.S. Fish and Wildlife Service.
- Requiring mine operators to use existing roads and to minimize the number of access routes within the designated transportation or utility corridor.
- Requiring mine operators to make appropriate arrangements for use and maintenance of existing roads when commercial hauling is involved.
- Requiring complete removal or confinement of oil field brine, slag, and all other waste to prevent escape as a result of rains or high waters.

- Prevention of all contamination of lands, waters, facilities, and vegetation.
- Requiring adequate measures to protect wildlife.
- Removal of all structures and equipment from the area when the need for them has ended (Ref. 33).

1.3.5 National Forests, BLM Lands, and Mining

While being managed to meet both multiple use and sustainable yield objectives, many tracts of federal land managed by the National Forest Service and Bureau of Land Management (BLM) are off limits to mining because of their designation as national wilderness, watershed protection areas, or scientific research areas. In fact, there are federally administered lands in only 19 of 50 States where mining claims may be located. These states are Alaska, Arizona, Arkansas, California, Colorado, Florida, Idaho, Louisiana, Mississippi, Montana, Nebraska, Nevada, New Mexico, North Dakota, Oregon, South Dakota, Utah, Washington, and Wyoming (Ref. 17). In these states, the BLM manages the surface of BLM lands and the Forest Service manages the surface of National Forest System lands. The BLM is responsible for the subsurface on both BLM lands and National Forest System lands.

1.3.6 National Forest System Mining Policy

On lands administered by the National Forest Service where mining is allowed, the policy of the forest service is to administer its minerals program to provide mineral commodities for current and future generations in balance with the need to sustain the long term health and biological diversity of national forest and national grassland ecosystems. In doing so, the forest service adheres to the following principles:

- Ensure that exploration, development, and production of mineral and energy resources are conducted in an environmentally sensitive manner, and that these activities are integrated with the planning and management of other resources using the principles of ecosystem management.
- Ensure that lands disturbed by mineral and energy activities, both past and present, are reclaimed using the best scientific knowledge and principles and returned to other productive uses.
- Ensure the integration of mineral resource programs and activities with the planning and management of renewable resources through the land and resource management planning process, recognizing that mineral development may occur concurrently or sequentially with other resource uses.
- Require reclamation plans for all proposed surface disturbing activities to return the land to productive uses consistent with the ecological capability of the area and in accordance with land management goals (Ref. 34).

1.3.7 Bureau of Land Management Mining Policy

The Bureau of Land Management (BLM) is the agency responsible for managing the largest percentage of federal lands, and was once perceived as focusing exclusively on

commodity related activities such as mineral development and livestock production. However, since passage of the 1976 *Federal Land Policy and Management Act*, the focus of the BLM's mission to "sustain the health, diversity and productivity of the public lands for the use and enjoyment of present and future generations," has shifted from not only conserving mineral and grazing resources, but also to the long term protection of renewable and nonrenewable environmental and recreational resources (Ref. 38 and 39). Such resources include: wildlife, wilderness, watersheds, timber, fish, and the natural, scenic, scientific, and historical values of BLM lands. The *Federal Land Policy and Management Act* states that multiple-use management involves the "harmonious and coordinated management of the various resources without permanent impairment of the productivity of the land and the quality of the environment," and that multiple-use management gives consideration "to the relative values of the resources and not necessarily to the combination of uses that will give the greatest economic return or the greatest unit output" (Ref. 39 and 40).

The *Federal Land Policy and Management Act* places no prohibition on establishing mineral claims on BLM lands which are open to mining. However, the act does require the BLM to ensure that claims which are staked do not have adverse environmental impacts on surrounding lands, and will be properly reclaimed. The right to mine on BLM lands is by no means guaranteed, and in some cases mining will be prohibited if it is felt that the environmental damage done to other natural and cultural resources by mining operations exceeds the economic benefits generated by engaging in the mining activity.

1.4 Case Study: New World Mine, Montana, U.S.A.

One high profile case study illustrating the potential problems of even mining lands *adjacent* to American protected areas is illustrated by the case of the New World Mine, located just 3 km from the northeast corner of Yellowstone National Park in the state of Montana (Map 3). Created in 1872, Yellowstone was America's first national park. It is internationally renowned for its geysers, the Yellowstone River Canyon, its vast forests and abundant wildlife, including large populations of grizzly bears, buffalo, and the only wolf population in the continental United States. Because of the international significance of Yellowstone's long protected ecosystems, the park was declared a UNESCO World Heritage Site in 1978.

The New World Mine was to be located on *private* property, on lands that had been mined at various times since the late 19th century. Although the mine site is surrounded by Yellowstone National Park and the Absaroka-Beartooth National Wilderness Area, the mine site was not included in the wilderness area specifically because of its rich mineral wealth. The proposed mine was expected to produce \$800 million in hard rock gold, silver, and copper ore over a 15 year period. Preliminary mine plans called for the construction of an underground mine, an ore processing mill, a tailings pond, a waste rock storage site, access roads, a work camp, and power transmission lines. On May 15,

1990, Crown Butte Resources Ltd. filed its operating plan for a hard rock mining permit with the state of Montana (Ref. 42).

Opposition to the Crown Butte mining plan was swift, and received direct support from the United Nations World Heritage Committee which voted to place Yellowstone National Park on its “List of World Heritage Sites in Danger” as a direct result of the proposed mine. Mine opponents received indirect support from President Clinton, who proposed a moratorium on mining on 19,000 federally owned acres around the mine, which would have effectively prevented any expansion of the mine. Opposition to the mine was based on the major concerns that the mine tailings retention ponds would fail in the event of a flood, avalanche, or earthquake, releasing acid mine wastes. All are legitimate concerns in the very seismically active Yellowstone area. Because of the mine’s location in the headwaters of both the national park and wilderness area, these concerns were taken very seriously and the proposed mine was prohibited by an act of Congress.

Under a bill passed by Congress at the President’s initiation, the Yellowstone Headwaters National Recreation Area was created from the New World Mine site, certain lands upstream of the park were withdrawn from mining, and previously mined lands in the area were required to be reclaimed. On August 12, 1996, facing increasing legislative obstacles and public opposition to the New World Mine, Crown Butte suspended permitting activities. In the final agreement reached between federal government and officials of Crown Butte Resources Ltd., the proposed mine site was purchased from its private owners and given to the US Forest Service in exchange for other unspecified federal lands valued at US \$65 million. Furthermore Crown Butte was to establish a US \$22.5 million fund for the reclamation of lands previously mined at and around the New World Mine site (Ref. 42 and 43).

Part 2: Canada

2.1 Canadian Special Protected Areas

Canada has one of the world's most extensive systems of special protected areas. At the national level, special protected area designations include: National Parks (including designated Wilderness Areas within National Parks), National Wildlife Areas, Migratory Bird Sanctuaries, Canadian Heritage Rivers, and National Historic Sites. The provincial and territorial systems of special protected areas are even more extensive than the national system, and include such designations as Provincial Parks, Provincial Ecological Reserves, and Provincial Wildlife Management Areas. Since analysis of the special protected area policies of each of the Canadian Provinces and Territories is beyond the scope of this paper, the following discussion will be limited to the policies of the Canadian Federal Government and the Province of British Columbia.

2.1.1 Canadian National Parks

Canada's first National Park was established at Banff in 1885, and today there are 39 parks in Canada's National Park System (Map 4). The system includes such diverse terrain as Ellesmere Island in the Canadian Arctic, Grasslands National Park on the plains of Saskatchewan, and Jasper National Park in the Canadian Rockies. The mission of the Canadian National Park System as stated in the 1930 *National Parks Act* is to maintain the national parks in an unimpaired state for the benefit, education, and enjoyment of all present and future generations of Canadians (Ref 44). In order to fulfill this mission, the *National Park Act* was amended in 1988 to ensure that national park management plans address protection of "ecological integrity" of the parks, so that the structure and function of natural park ecosystems are self-regenerating and unimpaired by man. A national goal has been set of establishing a national park in each of Canada's 39 recognized natural ecological regions. In order to achieve this goal, it is planned to add 14 more national parks to the system to bring the total area of national parks up to 3% of Canadian national territory (Ref. 45). While Canada's National Parks are managed for intensive recreation, including such diverse activities as wilderness trekking, commercial ski areas, and even golf courses, the main objective of the National Park System is to preserve representative tracts of Canada's wild ecosystems in the face of encroaching urbanization and development, particularly in the southern parks. In fact, a moratorium has been placed on construction of further resort type national park communities, such as Banff and Jasper, and it is unlikely that these types of communities will ever be allowed to be developed within National Park boundaries again. The administering agency for Canada's National Park System is Parks Canada, which manages 22,446,600 ha of park lands, or about 2% of Canada's national territory (Table 2). In addition to overseeing Canada's National Parks, Parks Canada also manages Canada's National Historic Sites, Canadian Heritage Rivers, and Marine Conservation Areas.

2.1.2 Migratory Bird Sanctuaries and National Wildlife Areas

Two other types of Canadian special protected areas are Migratory Bird Sanctuaries and National Wildlife Areas. After passage of the joint U.S. - Canadian *Migratory Birds Convention Act* in 1917, the Canadian Government began creating a national system of Migratory Bird Sanctuaries in order to implement the act (Ref. 47). The purpose of these sanctuaries was originally to protect migratory birds from indiscriminate slaughter at

their breeding and stopover grounds by commercial hunters. However over time, loss of habitat became a far greater threat to migratory birds than hunting. At present the Migratory Bird Sanctuary System seeks to protect migratory birds from both the direct physical threat of hunting and the indirect threat of habitat destruction or disturbance. Migratory Bird Sanctuary regulations prohibit, among other things, hunting, carrying of firearms, pets, disturbance of migratory birds, and collection of their eggs. However, regulations control activities within the boundaries of sanctuaries only when migratory birds are present. Today there are 98 Migratory Bird Sanctuaries with a total area of 11.3 million hectares, or approximately 1% of Canada's national territory (Table 2, Map 5).

In recognition of the fact that preservation of habitat was critical for the protection of other endangered species as well as migratory birds, the government of Canada passed the 1973 *Canada Wildlife Act*, which led to the creation of the National Wildlife Area System (Ref. 49). The purpose of the system is specifically to preserve habitat for migratory birds and other wildlife, particularly threatened species. Regulations governing National Wildlife Areas are in force year round, regardless of whether or not migratory animals and birds are present. Other goals of the National Wildlife Areas dictated by the *Canada Wildlife Act* include public education and ecological research. Thus most National Wildlife Areas permit ecotourism activities compatible with the goals of the wildlife area, such as hiking, birdwatching, and canoeing. At present there are 48 National Wildlife Areas with a total area of 489,332 ha, or approximately 0.05% of Canada's national territory (Table 2, Map 6).

Most Migratory Bird Sanctuaries and National Wildlife Areas are open to the public, although very few provide special visitor facilities such as wildlife viewing stands. Many sites are completely closed to the public seasonally, typically during migratory bird breeding and moulting seasons. Sites set aside for protection of extremely threatened species may be closed permanently to the public. The Migratory Bird Sanctuary and National Wildlife Area Systems are managed by the Canadian Wildlife Service.

2.1.3 British Columbia's Provincial Special Protected Areas

In addition to preserving 3% of Canada's national territory in national parks, the Canadian Government has set an overall goal of preserving 12% of national territory in a system of protected areas managed at both the national and provincial levels (Ref. 50). In fact the system of provincial protected areas is larger in areal extent than the national park system itself, and at present Canada has over 1000 provincial and territorial parks (Ref. 46). British Columbia alone has 700 Provincial Parks, Recreation Areas, Ecological Reserves, and Wildlife Management Areas covering an area of 11,596,081 ha, or 12% of provincial territory. These provincial protected areas are administered by BC Parks, British Columbia's park agency (Table 2, Map 7).

The mission of BC Parks is "to protect natural diversity and natural and cultural features in provincial parks and ecological reserves and to provide opportunities for outdoor recreation in parks" (Ref. 59). In executing this mission, it is intended that provincial protected areas will be managed to preserve British Columbia's ecological diversity,

while permitting forms of outdoor recreation, scientific study, and environmental education that are compatible with long term protection of natural ecosystems.

British Columbia's Provincial Parks and Recreation Areas are generally wilderness areas managed for access by outdoors enthusiasts such as hikers, skiers, and kayakers. Although some parks have constructed more permanent camping facilities near entrance stations to accommodate "car campers," development in the interior of parks is usually limited to primitive campsites. British Columbia's Provincial Ecological Reserves have been set aside for the goal of preserving "representative and special natural ecosystems, plant and animal species, features and phenomena," and the reserve system seeks to perpetuate rare species, biologic diversity, and genetic resources (Ref. 60). The goal of British Columbia's Wildlife Management Areas is specifically to manage wildlife habitat. The principal uses of Wildlife Management Areas are for scientific research and education, although limited access by the public is permitted for purposes of low impact ecotourism, such as birdwatching and wildlife photography (Ref. 66).

Table 2. Canadian Special Protected Areas

Protected Area Type	Number of Units	Total Area (hectares)	Percentage of Canadian National Territory
National Parks (including Wilderness Areas)	39	22,446,600	2%
Migratory Bird Sanctuaries	98	11,300,000	1%
National Wildlife Areas	48	489,332	0.05%
British Columbia Provincial Parks, Recreation Areas, Ecological Reserves, and Wildlife Management Areas	700+	11,596,081	1% (12% of Provincial Territory)

Sources: Ref. 46, 48, 57 and 58.

2.2 Establishing Mineral Rights on Public Lands in Canada

In contrast to the United States and Mongolia, which have national mining laws, laws for establishing mining rights on public lands open to mining in Canada are developed by the individual provincial governments. Analysis of the mining policies of each Canadian

province is beyond the scope of this paper, thus the following discussion will be limited to the case of British Columbia. The mineral policies of the remaining provinces may be explored via the internet.

Minerals on all public lands open to mining in British Columbia are the property of the government, and private development of these minerals is subject to payment of various royalties, taxes, and fees. Mineral policies in British Columbia are guided by the 1996 *Mineral Tenure Act*, which governs mineral rights on the province's public lands (Ref. 63). Under the *Mineral Tenure Act*, before engaging in mineral exploration and extraction activities in British Columbia, a person must first obtain a "Free Miner Certificate" from the provincial government. The Free Miner Certificate is issued for a fee to persons who can satisfactorily demonstrate "a minimum prescribed standard of knowledge respecting mineral exploration and integrated resource management principles in British Columbia" (Ref. 63). The certificate can be revoked if relevant laws are violated, effectively terminating the holder's right to engage in mining activities in British Columbia.

Free miners are permitted to enter upon any unoccupied provincial lands that are open to mining, provided that mineral rights in an area are not already held by another party. In British Columbia the process for establishing mineral rights in an area, as in America, involves "staking a claim." An individual may establish a claim by simply setting up corner stakes which define the claim boundaries, and then filing a description of the claim, its location, the personal information of the holder, and a recording fee with the British Columbian government. In British Columbia a mineral claim gives the holder exclusive rights to explore for and develop minerals within the area covered by the claim, and is the approximate equivalent of a Mongolian mineral exploration license (see Appendix A, section 4.2). British Columbian mineral claims differ from American mineral claims in that they fully protect the claim holder's rights to minerals in the claim area *prior to discovery* of a valuable mineral deposit, as well as after discovery. Mineral claims issued under the *Mineral Tenure Act* are valid for all metal ores, minerals, and dimension stone, but do not cover oil, gas, coal, peat, sand, gravel, or soil. Mineral claims are valid for an initial period of one year, and can be renewed annually if it can be demonstrated that a prescribed amount of exploration and development work has been performed on the claim in the preceding year.

Annual production on mineral claims in British Columbia is limited to 1000 tonnes of ore, or 2000 m³ of metal bearing placer deposit. If production exceeds these amounts, a mineral lease must be obtained from the government and annual land rental fees paid. Mineral leases are valid for an initial period of 30 years and can be renewed, and are analogous to mining licenses in Mongolia (see Appendix A, section 4.2). Prior to all surface disturbing activities on both mineral claims and mineral leases, permission from the relevant provincial government agencies must first be obtained.

2.3 Mining and Canadian Special Protected Areas

Analysis of Canadian policy concerning mining and special protected areas is complicated by the fact that in addition to the national park system, collectively there is an even larger provincial park system, with each province having its own policy concerning mining in provincial protected areas. While the management policies of each provincial park system can be explored via the internet, the following discussion will be limited to the policies of Canada's National Park System and British Columbia's Provincial Park System, and will be illustrated with a case study from British Columbia (Ref. 51).

2.3.1 Canadian National Park System Mining Policy

Commercial exploration and extraction of minerals is forbidden in Canadian National Parks, as stated in Canada's national parks regulations (Ref. 52). Valid mining claims existing within proposed park boundaries prior to creation of a national park are excluded from the park after its creation. However, Parks Canada will use all possible legal means to extinguish existing mineral exploration and extraction activities within proposed national parks, in order to achieve its mission of preserving the ecological integrity of park ecosystems for future generations. How a preexisting mine or mine claim in an area selected for inclusion in the National Park system is dealt with is handled on a case by case basis.

For *active mining operations* in areas proposed for national park designation there are 2 main alternatives:

- The boundaries for the proposed national park can be redrawn to exclude the mine site.
- If it is not possible to redraw the park boundaries to exclude a mine, Parks Canada would likely conclude that it is not feasible to create the proposed park due to conflicting land uses and/or impairment of the area's ecological integrity, and would look to create the national park somewhere else (Ref. 53).

If the proposed park area includes mineral claims but not active mines, Parks Canada can proceed several ways depending on the nature of the mineral claim and the extent of claim staking. It is important to note, however, that Parks Canada will not expropriate any mineral claims.

For *extensive claims* within boundaries of a proposed national park, there are 2 primary options:

- If the claims are on properties with proven high mineral resource potential, the boundaries of the proposed park would likely be amended to exclude the mineral claims, if at all possible. Such a case has occurred recently in the Manitoba

Lowlands, where the west boundary of the proposed Interlake National Park was amended to exclude an area of high nickel-iron potential.

- If mineral claims were extensive and of high speculative value, Parks Canada would likely abandon the national park proposal altogether and look somewhere else, as was the case of the proposed national park in the Bathurst Inlet, Northwest Territories (Ref. 53).

If mineral claims are not extensive, there are several possibilities:

- Parks Canada can approach the company holding the mineral claim and request that they relinquish the claim voluntarily as an "environmental good will gesture." For example, this approach was used successfully in the case of Grasslands National Park, Saskatchewan and Gwaii Haanas National Parks, British Columbia.
- The mineral claims could be extinguished by the provincial government if they were on provincial crown land, which is land owned and administered by the province. The holder of the claim is normally compensated for the expenses incurred to date, but not for the "speculative value" of the mineral deposit. This is the approach that the Government of Newfoundland-Labrador has followed in the case of the proposed Torngat National Park in northern Labrador.
- Alternatively, Parks Canada may simply wait for a claim to lapse, hoping that a claim holder will abandon a claim over time. The claim area, however, would be excluded from the park until such time (Ref. 53).

2.3.2 Migratory Bird Sanctuary and National Wildlife Area Mining Policy

In Canada, it is generally accepted by managing agencies that mineral exploration and extraction activities are incompatible with conservation of wildlife and wildlife habitat. Hence Migratory Bird Sanctuaries and National Wildlife Areas are managed with this view in mind.

For the Migratory Bird Sanctuary System, legislation does not provide specific protection for bird habitat. Only the birds, their nests and eggs are protected, and only during the seasons that the birds occupy the sanctuary each year. Thus multiple use of Migratory Bird Sanctuary lands, including mining, is not expressly forbidden. The majority of sanctuary lands are a mix of federal or provincial lands, with the remaining being private lands. Owners of private land within Migratory Bird Sanctuaries may modify local habitat provided that they do not directly impact the birds themselves, or the site's suitability as a bird sanctuary. Mineral exploration and extraction activities on sanctuary lands owned by federal and provincial governments are handled on a case by case basis, and require permission from the Canadian Wildlife Service to proceed. However, given the potential for adverse impacts on wildlife from mineral activities, the Canadian

Wildlife Service to date has almost uniformly denied permission to conduct mineral projects on Migratory Bird Sanctuary lands. One notable exception occurred at the Queen Maud Gulf Migratory Bird Sanctuary, Nunavut, on Canada's Arctic Ocean coast. At this sanctuary, the Canadian Geological Survey was granted permission by the Canadian Wildlife Service to conduct geological mapping for the public record within sanctuary boundaries. However, had a private company proposed to conduct exploration work within the sanctuary to determine potential for mineral development on sanctuary lands, permission for the project would have been denied by the wildlife service (Ref. 54 and 55).

Canada's National Wildlife Area System was established specifically for the preservation of wildlife habitat, and all activities within National Wildlife Areas require the permission of the Minister of the Environment. Permission is only granted for activities which will have no impact on the species and habitat for which the area was established. To date permission has never been granted to conduct mineral exploration or mining within a National Wildlife Area, and it is not anticipated that permission will be granted in the future (Ref. 54). Furthermore, under the list of "General Prohibitions" in the Canada's National Wildlife Area regulations, it is expressly prohibited to "disturb or remove any soil, sand, gravel or other material" and "carry on any commercial or industrial activity," which clearly preclude all non-governmental mineral exploration and mining activities (Ref. 49).

In the event that newly created Migratory Bird Sanctuaries and National Wildlife Areas are to be declared in an area that has preexisting mineral claims, the Canadian Government handles the situation on a case by case basis in a similar manner as for establishment of new national parks. Methods of conflict resolution in these areas include:

- Selecting areas that do not have pre existing mineral exploration and mining licenses.
- Encouraging companies to voluntarily relinquish their mineral claims for positive public relations, sometimes under government pressure as a trade off for development of other locations.
- Placing strict access and reclamation requirements on mineral claims within Migratory Bird Sanctuaries and National Wildlife Areas to minimize permanent damage to the site, and forcing companies to relinquish mineral claims of marginal profitability by placing prohibitively expensive environmental protection requirements on their development (Ref. 56).

2.3.3 British Columbia Provincial Special Protected Area Mining Policy

Mineral exploration and extraction is prohibited in British Columbia's Provincial Parks, Recreation Areas, and Ecological Reserves. British Columbia's Park Regulations specifically state that it is forbidden to:

- Possess any natural resource or property of a park or recreation area.
- Remove any natural resource or property from a park or recreation area.
- Engage in any research or collection activity in a park or recreation area.
- Damage or destroy any natural resource or property in a park or recreation area (Ref. 61).

In the case of provincial Ecological Reserves, British Columbia's 1971 *Ecological Reserves Act* is the governing piece of legislation which prohibits mining and all other consumptive resource uses within Ecological Reserves (Ref. 60 and 62).

In the event that a new Provincial Park, Recreation Area, or Ecological Reserve is created which contains active mineral claims and leases within its boundaries, British Columbia has two main approaches to resolving the conflict. For mineral claims and leases well within the park boundaries, British Columbia seeks to extinguish these mineral licenses by negotiating a fair settlement with the license holder so that the license area can be included in the park (see case study). If the mineral license overlaps the boundaries of a new protected area, British Columbia may opt to wait until the license has expired before incorporating the license site into the protected area. The 1996 *Mineral Tenure Act* does allow the British Columbian government to grant special exemptions to permit mining in "Class B" Recreation Areas. However, this exemption is no longer exercised since all Class B Recreation Areas are presently being redesignated as "Class A" or "Class C" Provincial Parks, where mineral exploration and extraction are expressly forbidden (Ref. 63 and 64).

One minor exception to the general prohibition on mining in British Columbia's protected areas is the case of the province's small, 18 unit system of Wildlife Management Areas, created by the 1996 British Columbia *Wildlife Act* (Ref. 65). Although designated specifically for the management of wildlife habitat, the government can permit mineral exploration and extraction activities within these areas if after study these activities are not seen to be detrimental to the purposes for which the Wildlife Management Area was created (Ref. 64 and 66).

2.4 Case Study: Windy Craggy Mine, British Columbia, Canada

The Windy Craggy copper deposit is located in the mountains of the extreme northwest corner of British Columbia, near the triple junction of the boundaries between British Columbia, Alaska, and the Yukon Territory. The deposit lies about 80 km east of Alaska's Glacier Bay National Park and the Chilkat Bald Eagle National Preserve, and forms part of the Tatshenshini and Asek River watersheds (Map 8).

In 1988, a Canadian mining company, Geddes Resources Limited, began the process of obtaining authorization from the government of British Columbia to mine the copper deposit. After Geddes had spent CDN \$50 million on exploration work, it was estimated

that the value of the copper deposit was CDN \$8.5 to CDN \$15 billion dollars, and that the mine would have a minimum lifetime of 50 years. It was also estimated that 500 people would be employed directly by the mine, another 1500 indirectly by providing services to the mine, and that the mine would generate a combined total of CDN \$1.3 to CDN \$1.6 billion in tax revenues for the provincial and federal governments. Millions of other acres around the site remained unexplored but looked promising for further large discoveries (Ref. 67). If developed, the Windy Craggy mine would have been the largest open pit copper mine in the western hemisphere (Ref. 68).

The deposit site is extremely remote, and in their initial plan Geddes proposed construction of a 70 mile long road from the mine site to the Haines Highway. By this plan 150 trucks a day would have made the journey from the mine to the port town of Haines, Alaska, on the Chilkoot Inlet, where the ore would have been shipped to Asian smelters. However, the proposed road would have followed the treacherously sharp bends of the Tatshenshini River so closely as to create a potential hazard for ore trucks. Thus the mine operations plan was revised so that instead a 150 mile long slurry pipeline would have transported a mixture of copper ore and water to Haines for shipment to Asia (Ref. 69).

Geddes's plan for developing the Windy Craggy deposit were met with widespread opposition, and in 1991 more than 50 environmental groups united to form Tatshenshini International in order to oppose the plan. The proposed mine posed numerous potential threats to the regional environment. To begin with, the copper ore at Windy Craggy had very high sulfur content, approximately 35%, with an extremely large potential for creation of acid drainage that could have adversely effected the Tatshenshini and Alsek rivers, and also the coastal waters around the mouths of these rivers (Ref. 69). Most importantly, release of acid drainage into these waters could have wiped out the prolific salmon populations which spawn in these rivers, and consequently led to the demise of the multi-million dollar commercial salmon fishing industry based at Dry Bay, on the Gulf of Alaska. Loss of salmon populations would have also adversely affected the large bear populations in the area, which subsist in large part on salmon, and likewise Alaska's indigenous Chilkat people, who depend on both fishing and hunting in the area for their survival (Ref. 68). Although Geddes proposed construction of 2 tailings dams to pool mine runoff and to prevent the release of acid drainage directly into the environment, the large amount of seismic activity in the area, which has almost daily low level earthquakes, cast doubts on the safety of this arrangement as well as on the safety of the proposed slurry pipeline. Furthermore, the noise and excavation work from the immense mine would have directly destroyed the habitat of Canada's largest concentration of grizzly bears, the only winter range of Dall sheep in British Columbia, as well as prime habitat for large populations of black bears, mountain goats, and wolves.

The magnitude of the threat from the proposed mine to several of Alaska's most important protected areas and wildlife resources led then Senator Al Gore to introduce a resolution concerning the issue into the U.S. Senate in April of 1992. In his resolution Gore called on the U.S. Secretaries of State and the Interior to enter into agreements with the Canadian government to prevent the Alsek River, Tatshenshini River, and Alaska's

Glacier Bay National Park from being adversely affected by the proposed Windy Craggy mine. As a result, the government of British Columbia quickly announced that a full environmental impact study would be conducted on the Tatshenshini watershed to evaluate whether or not mining should be permitted in the area.

In September 1993, following continued public opposition to the mine, the government of British Columbia extinguished Geddes Resources Ltd.'s claim to the Windy Craggy copper deposit, and also 170 other mineral claims in the area (Ref. 69). In place of the mine, the 958,000 ha Tatshenshini-Alsek Wilderness Provincial Park was created, and further mineral exploration and extraction activities within the park boundaries were banned in perpetuity (Ref. 68). The problem of compensation for extinguished mineral claims in the new park was handled by the British Columbian Ministry of Energy and Mines. Although complex, the settlement included funding granted to Geddes Resources to develop mines at other locations within British Columbia (Ref. 64).

Creation of the Tatshenshini-Alsek Wilderness Park, in addition to saving a multi-million dollar a year commercial salmon fishing industry from the threat of destruction by acid mine drainage, also spawned a 200% increase in annual tourist visits to the area, from which river rafting expedition businesses alone generate CDN \$2 million annually (Ref. 68). In 1994 the Tatshenshini-Alsek Provincial Wilderness Park was inscribed on the UNESCO World Heritage List as an extension of the preexisting and contiguous Wrangell-St. Elias, Glacier Bay, and Kluane National Parks World Heritage Site.

Part 3: Australia

3.1 Australian Special Protected Areas

Of the U.S., Canadian, and Australian models of special protected area management, the Australian system is by far the most decentralized, vesting nearly all responsibility for declaration and management of protected areas, including national parks, in the Australian states themselves. While in 1997 there were 5645 terrestrial special protected areas in Australia with a total area of 59,752,783 ha, or about 8% of national territory, there are at present only 6 National Parks, and 5 Nature Reserves managed by the central Australian Commonwealth Government (Table 3, Maps 9A and B). In fact, the Australian Commonwealth's national park agency, Parks Australia, was intended to only administer special protected areas located offshore and in non self-governing territories, such as island territories, the Northern Territory, and the Australian Capital Territory, where no state governments hold jurisdiction (Ref. 71).

The remainder of the over 5600 terrestrial special protected areas, including 449 *national* parks, are established and managed independently by the Australian States and Territories themselves. Since the analysis of each Australian state's individual policies concerning special protected areas and mining is beyond the scope of this paper, the present discussion will be limited to the policies of the Commonwealth national parks agency, Parks Australia, and the states of New South Wales and Western Australia. Further exploration of the remaining state and territorial policies on special protected areas and mining can be conducted via the internet (Ref. 72).

3.1.1 Australian Commonwealth National Parks

Parks Australia has adopted the 1994 International Union for the Conservation of Nature (IUCN) definition of protected areas as "areas of land and/or sea especially dedicated to the protection and maintenance of biological diversity, and of natural and associated cultural resources, and managed through legal or other effective means" (Ref. 71). As discussed above, Parks Australia only establishes and manages special protected areas on territory that lies outside the jurisdictions of the 6 Australian States, as guided by the 1999 *Environment Protection and Biodiversity Conservation Act*, and formerly by the 1975 *National Parks and Wildlife Conservation Act* (Ref. 73 and 74). At the present time there are a total of 20 special protected areas overseen by Parks Australia of which only 4 are on the Australian mainland, the remaining 16 being offshore island and marine special protected areas. These special protected areas have the following designations:

- 6 National Parks - 2 of which are in the Northern Territory, 4 of which are island parks. The goal of the National Parks is to establish relatively large mainland and island protected areas to preserve representative samples of major natural regions. These areas have features or scenery of national or international significance where ecosystems, plant species, animal species, habitats, as well as geomorphology are of special scientific, educational and recreational interest.
- 5 National Nature Reserves - all of which are offshore. The goal of the National Nature Reserve System is to create a comprehensive, adequate, and representative

system of protected areas of national significance, including both land and sea environments, for the purpose of nature conservation.

- 4 Marine Parks. The goal of these parks, and also of the marine reserves (below) is to protect tropical islands and cays and temperate marine environments for the protection of marine biota and ecosystems.
- 3 Marine Reserves
- 2 Botanic Gardens - which are dedicated to growing, studying, and promoting Australian native plants (Ref. 71 and 70).

Parks Australia also collaborates with the state governments of Victoria and New South Wales and the Australian Capital Territory administration in promoting a unified management plan for the Australian Alps National Parks, which span these three provinces. The only two mainland Commonwealth National Parks managed directly by Parks Australia are the internationally famous Uluru-Kata Tjuta National Park (Ayer's Rock), area 132,566 ha, and Kakadu National Park, area 1,980,400 ha, both of which are located in the Northern Territory (Table 3, Ref. 70).

3.1.2 New South Wales State Special Protected Areas

The New South Wales 1974 *National Parks and Wildlife Act* provides for the creation of most special protected areas in the state of New South Wales, while the New South Wales 1987 *Wilderness Act* provides for the establishment, management, and protection of wilderness areas in the state (Ref. 77 and 78). The 1974 *National Parks and Wildlife Act* also established the New South Wales National Parks and Wildlife Service, which manages most of the state's special protected area categories. As of 1997 there were 510 terrestrial protected areas in New South Wales with a total area of 4,274,068 ha or about 5% of state territory, including the following designations (Map 10, Table 3):

- 98 National Parks. The goal of the New South Wales National Parks is to permanently set aside relatively large areas for the preservation of predominantly unspoiled natural landscape, flora, and fauna for public enjoyment, education, and inspiration. Park management policy is to protect these areas from human disturbances so that their natural values are preserved.
- 215 Nature Reserves. The goal of the New South Wales Nature Reserves is to preserve areas which contain wildlife or natural phenomena of special scientific interest. Management practices for nature reserves are designed to maximize the value of the area for purposes of scientific investigation and education.
- 167 Flora Reserves. The goal of the New South Wales Flora Reserves is to side aside land for the preservation of native flora in its natural environment.

- Wilderness Areas. The goal of the New South Wales Wilderness Areas is to preserve land in a state that has not been substantially modified by humans or is capable of being restored to such a state (Ref. 70).

3.1.3 Western Australia State Special Protected Areas

Under Western Australia's 1933 *Land Act*, the Governor of Western Australia was granted power to reserve land for public purposes, including creation of special protected areas for land preservation (Ref. 81). Under Western Australia's 1984 *Conservation and Land Management Act*, the Department of Conservation and Land Management was created to manage Western Australia's special protected areas (Ref. 82). At present, Western Australia has 1187 terrestrial special protected areas with a total area of 15,927,519 ha, or about 6% of state territory, which include the following designations (Map 11, Table 3):

- 78 National Parks. The goal of Western Australia's National Parks is to preserve lands for wildlife and landscape conservation, scientific study, preservation of features of archaeological, historic or scientific interest, and also for recreational enjoyment by the general public. These areas have scenic, cultural, and biological value of national and international significance.
- 1067 Nature Reserves. The goal of Western Australia's Nature Reserves is to preserve lands for flora, fauna, and landscape conservation, scientific study, and preservation of features of archaeological, historic, or scientific interest. Forms of recreation compatible with the goals of preserving the ecosystems and historic values of these areas may be allowed.
- 17 Conservation Parks. The goals of Western Australia's Conservation Parks are the same as the state's national parks. However, the conservation parks do not have the same level of national or international significance as the national parks, although they are of important local or regional value for conservation and recreation (Ref. 70).

Table 3. Australian Special Protected Areas

Protected Area Type	Number of Units	Total Area (hectares)	Percentage of Australian National Territory
Commonwealth Administered Terrestrial National Parks	2	2,112,996	0.3%
New South Wales State Special Protected Areas	510	4,274,068	0.6% (5.3% of State Territory)
Western Australia State Special Protected Areas	1187	15, 927,519	2.1% (6.3% of State Territory)
Combined Commonwealth and State Totals	5645	59,752,783	8%

Sources: Ref. 70 and 75.

3.2 Establishing Mineral Rights on Public Lands in Australia

As in Canada, laws concerning the establishment of mineral rights on public lands open to mining in Australia are created by the individual Australian states. Again as in Canada, analysis of each Australian state's mineral policies is beyond the scope of this paper, but may be explored via the internet. The following discussion will be limited to the case of Western Australia, where the 1978 *Mining Act* governs all mining activities in the state (Ref. 83). All minerals found on public lands in Western Australia, including fossil fuels and building materials, are considered the property of the government, and royalties must be paid to the government for their development.

In order to prospect on or obtain a mineral license or lease for public lands open to mining in Western Australia, an individual must first obtain a "Miner's Right," similar to British Columbia's "Free Miner's Certificate." A Miner's Right is readily available from the government of Western Australia upon filling out a short form and payment of a small fee.

In Western Australia mineral exploration licenses are analogous to Mongolian mineral exploration licenses (see Appendix A, section 4.2). However, Western Australia issues exploration licenses based on a system of land "blocks" of fixed area and location as predetermined and mapped by the state government. A single exploration license can range in size from 1 to 70 predetermined blocks. Since the exploration blocks have already been mapped by the state government, the license applicant does not need to

mark the boundaries of a new exploration license area with stakes, but simply select the land blocks to be explored from a map of available blocks. Exploration area rental fees are charged, and the term of exploration license is generally limited to a maximum of 5 years.

Once a block has been explored, a mineral lease, analogous to a mining license in Mongolia, must be obtained before mining begins. Within the larger exploration area, the mineral lease applicant must mark the boundaries of the actual area to be mined with 1 m high stakes. Following staking, a description of the area, its location, the applicant's personal information, and a map of the site must be filed with state government in order to obtain the mineral lease. An application fee and the first year's rent is payable upon filing the lease application. A mineral lease is valid for 21 years, but may be renewed.

3.3 Mining and Australian Special Protected Areas

Analysis of Australia's policy concerning mineral exploration and extraction in special protected areas is complicated by the fact that the Commonwealth government and each state and territory has its own policy. These policies vary markedly from complete prohibition on exploration and mining in protected areas to permitting some limited mining for resources of high strategic or economic value in marginal zones of protected areas. Examples of these widely varying policies will be examined below and will be illustrated with the case of the Ranger uranium mine, located in Kakadu National Park in Australia's Northern Territory.

3.3.1 Australian Commonwealth Special Protected Area Mining Policy

The Australian Commonwealth's policy on mineral exploration and extraction in the special protected areas under its jurisdiction was guided for 25 years by the 1975 *National Parks and Wildlife Conservation Act*, which was replaced on July 16, 2000 by the *Environment Protection and Biodiversity Conservation Act* (Ref. 73 and 74). Both pieces of legislation placed prohibitions on mineral exploration and mining activities in Commonwealth special protected areas unless a special exemption is granted by the Governor General, the British monarch's chief representative in Australia. Such an exemption can only be granted following a recommendation to permit mining in the protected area from the Australian Government as part of an official protected area management plan approved by both houses of Australia's Parliament. However, although this right to grant exemptions exists, to date no park management plans approved by parliament have provided for mining in Commonwealth special protected areas. In the case of Kakadu National Park, mining has been prohibited outright, and no exemptions may be granted (Ref. 73 and 76).

Since by law there is a complete ban on mineral exploration and extraction activities in Australia's Commonwealth administered protected areas, pre-existing mineral licenses that fall within the boundaries of a newly created protected areas must either be acquired by Parks Australia through donation or purchase, or the protected area boundaries

redrawn to exclude the license areas. This process will be discussed further in the following case study examining mining in Kakadu National Park (Ref. 76).

3.3.2 New South Wales State Special Protected Area Mining Policy

Section 41 of the New South Wales 1974 *National Parks and Wildlife Act* clearly states that "it is unlawful to prospect or mine for minerals in a National Park or Historic site, except as expressly authorised by an Act of Parliament" (Ref. 77). Further sections of the law also prohibit mineral exploration and extraction in nature reserves as well as in other types of special protected areas. Although the New South Wales parliament does have the power to grant special permission to mine in state protected areas, since the passage of the *National Parks and Wildlife Act* in 1974 this power has never been exercised, in large part due to negative public opinion concerning mining in National Parks (Ref. 79). The act also grants the New South Wales Minister for the Environment the right to permit limited mineral prospecting on behalf of the government in national parks. However, this exemption has only been used to perform general geological mapping by state agencies for the public record, not specifically for mineral prospecting (Ref. 79 and 80). It is unlikely that exemptions for either mining or commercial mineral exploration in New South Wales state protected areas will be granted anytime in the foreseeable future (Ref. 79).

Since there is a blanket prohibition on mineral exploration and extraction in New South Wales special protected areas, if a mine or mineral license falls within the boundaries of a new state protected area, there are two primary options. Either the boundaries of the new protected area must be redrawn to exclude the mine or mineral license, or the mine or license must be relinquished and all mineral exploration and extraction activities cease. In the cases of the creation of the Blue Mountain and Wollemi National Parks, the parks were created in spite of large known coal reserves in these areas because it was felt that the environmental values of these areas in their undisturbed state exceeded their potential energy resource values (Ref. 79). Furthermore, although the State of New South Wales respects existing mineral rights on lands in newly designated special protected areas, Section 39, #3 of the *National Parks and Wildlife Act* states that "...no such interest (e.g. mineral licenses) shall be renewed nor shall the term of any such interest be extended except with the approval of the Minister and subject to conditions as the minister determines" (Ref. 77). Thus upon expiration of a mineral exploration or extraction license within a special protected area, the Minister for the Environment has the right to not renew the license, as occurred recently at Gunderbooka National Park (Ref. 77, 80).

3.3.3 Western Australia State Special Protected Area Mining Policy

Mineral Exploration and development on public lands in Western Australia, including special protected areas, is administered under Western Australia's 1978 *Mining Act* (Ref. 83, see section 3.2). While other Australian states have opted to place a complete prohibition on mineral exploration and extraction in their special protected areas, in the state of Western Australia all special protected areas are potentially open to mineral exploration and mining. In practice though, mining opportunities in Western Australia's protected areas are largely restricted to deposits located in the marginal zones of protected areas, where mining will not interfere with area's critical features. Permission

to mine in the state's protected areas is generally limited to mineral resources of strategic importance or of such rare and high value that development of the deposit will be of significant economic benefit to the state and nation. In any event, all proposed mining developments in Western Australian protected areas require an Environmental Impact Assessment conducted by the state Environmental Protection Authority, and also the approval of the state Minister for the Environment, the state Minister for Mines, and both houses of the Western Australian state parliament. Furthermore it is understood that the most spectacularly scenic or ecologically important zones of the state's special protected areas are off limits to mining in perpetuity (Ref. 84 and 85).

In the event that mineral exploration or mining is permitted within a Western Australia state protected area, these mineral activities will be subject to far more rigorous environmental oversight than mineral activities conducted on unprotected public lands, and must not be detrimental to the goals for which the protected area was established. Following is a list of some of the environmental protection measures that must be implemented by mining companies operating within Western Australia's special protected areas:

- Approval of all work plans by Western Australia's Department of Minerals and Energy, Department of Environmental Protection, Department of Conservation and Land Management, and the Environmental Protection Authority before work begins.
- Posting of a reclamation bond to ensure that reclamation will be carried out.
- Filing of an Annual Environmental Report by all companies operating in special protected areas.
- Public access to all Environmental Impact Assessment reports.
- Recapping of all surface boreholes.
- Reclamation of all exploration land disturbances, including vehicle tracks, trenches, and boreholes, must be completed within 6 months after work finishes.
- Measures must be taken to correct failed reclamation work.
- Removal of all rubbish, waste, equipment and temporary structures prior to or upon termination of work.
- Fuel spillage must be prevented.
- Written permission must be obtained from the district Mining Engineer prior to the use of earth moving equipment such as bulldozers and backhoes.
- Topsoil must be adequately stored and replaced.

- All vehicles, machinery, and equipment must be cleaned before entering a special protected area to prevent spread of soil borne diseases.
- Restriction of vehicle access to routes approved by the Department of Conservation and Land Management.
- Provision of a work itinerary to the Department of Conservation and Land Management with 7 days advance notice of any changes to the itinerary.
- Observation of the prohibition on domestic animals, firearms, and traps within special protected areas.
- Creation of camps or fuel depots only as approved by the Department of Conservation and Land Management (Ref. 86).

In spite of the state of Western Australia's detailed regulations concerning mineral exploration and extraction, public opinion in opposition to these activities is vocal and far reaching. There have been 4 major policy shifts on the issue since 1983, and it is not inconceivable that the state policy will change again in favor of putting all special protected areas off limits to mineral activities at some point in the future. In recognition of this fact, both the government and mining industry in Western Australia have sought to improve their image in the public's eye by undertaking numerous environmental projects, such as land exchanges, to mitigate degradation of protected areas resulting from mining activities. For example, following the highly controversial excision of 5000 ha from Karijini National Park for the extraction of an iron ore deposited estimated to be worth AUS \$500 million, 3 other key areas totaling 20,800 ha were added to the park (Ref. 85).

3.4 Case Study: Ranger Mine, Northern Territory, Australia:

The Northern Territory's Alligator Rivers region has long been inhabited by Australian Aborigines, and is the site of a large, globally significant, concentration of aboriginal rock art. Although largely uninhabited, the area is considered a cultural landscape due to long practiced aboriginal land management regimes. The region has exceptionally high biodiversity, in large part due to its wide range of terrestrial and aquatic ecosystems which include: sandstone heathlands, open woodland, monsoon rainforest, floodplains, large rivers, seasonal water courses, and permanent billabongs. The wetlands of the area are considered to be of international importance. Fauna surveys from the region list 64 native mammals, 274 bird species, and 128 reptile species, including 3 species of sea turtle and 1 species of crocodile that are listed as globally threatened (Ref. 88). Following the discovery of uranium in the Northern Territory near Darwin in 1949, intensive exploration led to later discoveries of the Ranger and Jabiluka uranium deposits in the East Alligator River region (Map 12, Ref. 87). Following a proposal in 1975 to

develop the Ranger deposit, the Australian government began investigating potential environmental impacts of uranium mining on the region.

In 1977 the Australian government announced its decision to permit mining and export of uranium under the extremely rigorous environmental protection controls recommended by the *Ranger Uranium Environmental Inquiry*, a detailed investigation into the possible impacts of uranium mining on the area. Key features of the mine plan designed to protect the unique ecological and cultural features of the region and to minimize disturbance to local aboriginal communities included:

- Granting of ownership of the region to its traditional Aboriginal inhabitants under the Northern Territory's 1976 *Aboriginal Land Right Act*.
- Creation of Kakadu National Park from Aboriginal lands leased back to the government.
- Establishment of a comprehensive environmental research and monitoring program administered by the Commonwealth Department of Environment and Heritage to insure that mining activities did not have adverse ecological effects on the 100 km of river corridor downstream of the mine, including both its animal and human inhabitants (Ref. 87).

Thus while the Ranger mine was permitted to begin operations, it was also the impetus for returning ownership of the lands to the traditional inhabitants of the area, and for the creation of the National Park which entirely surrounds the mine property (Map 12). Under the terms agreed to in order to open the mine, a strict program for environmental protection at the Ranger site was developed which addressed the following topics:

- Control of water.
- Atmospheric pollution control.
- Mine technology.
- Blasting.
- Sulfur stockpiles.
- Waste rock dumps.
- Vegetation protection.
- Environmental monitoring.
- Environmental research (Ref. 87).

The environmental protection management plan at the Ranger site included construction of a special retention pond for all high uranium content runoff water from mine pits, ore stock piles, tailings, and the mill site. This pond was designed so that uranium contaminated water would not be released to the environment except in years of exceptionally high rainfall, of the magnitude expected to occur on average once every 10 years (Ref. 87). However, in response to Aboriginal objections, in the 20 year life of the mine no high uranium content water has been released to the environment from this retention pond. Instead, high uranium content water is stored in the mine pit during wet

season and is disposed of during dry season by evaporation and irrigation. Two other retention ponds have been constructed to collect water with low uranium content, which originates as runoff from waste rock stockpiles. These low uranium content ponds have been designed to occasionally overflow into a nearby creek, and water has been released from these ponds during wet season at various times during the life of the mine. Extremely contaminated process water used for milling uranium has never been considered for release, and is continuously recycled or disposed of by evaporation.

Although high uranium content water has yet to be released from the mine site, in the event that it is necessary to release this water, such as during a catastrophic flood, a rigid system of water quality standards and environmental monitoring has been established to protect aquatic ecosystems and local residents. This monitoring system includes prerelease biologic toxicity tests, set maximum release levels, and total release loads of relevant chemical constituents. Chemical release loads are based on chemical content of ore and waste rock, and also based on substances introduced in the milling process. Maximum release levels meet United States Environmental Protection Agency water quality standards, and are set at very conservative levels. Toxicology studies are based on both local and international standards. In addition, creek flow rates were studied and mine water release rates were designed so that minimum standards for safe levels of toxins will be exceeded by a factor of 10, based on sensitive measures of the health of 19 local species of aquatic flora and fauna (Ref. 87).

In the event of a high uranium content water release, environmental monitoring is the responsibility of the mine, and would include:

- Full chemical analysis of water prior to release.
- *Daily* measurement of water quality variables in the mine effluent, and in the creek at one upstream and two downstream locations from the release point.
- Biological testing of species for survival rate of young.
- Community ecology studies both upstream and downstream of the release site.
- Annual population counts of fish during wet season (Ref. 87).

Water monitoring is also performed continuously to evaluate effects of occasional releases of low uranium content water into the creek below the mine. As a result of this monitoring, small increases in sulfate and uranium in the creek were detected and the problem corrected well before the levels of these substances reached maximum acceptable levels. Additional environmental monitoring includes tests of annual survival rates of vertebrate and invertebrate species in water both upstream and downstream of the mine, and annual macroinvertebrate population counts of 2 species of migratory fish. To date, environmental monitoring has shown no effects on local biota from mine wastewater releases.

The greatest risk to Aborigines living in the area is from uranium bioaccumulation in those persons who have a traditional diet based on hunting and fishing. However analyses of urine and feces samples from the high risk groups of hunters and fisherman showed no detectable level of uranium nuclides, and even conservative estimates of

exposure were 10 to 100 time lower than International Commission on Radiological Protection (ICRP) maximum recommended exposure levels. Monitoring of air quality has shown risk of exposure to radon gas and airborne radionuclides to be consistently less than 5 - 10 % of ICRP maximum recommended exposure levels (Ref. 87).

In addition to comprehensive environmental monitoring of air, water, wildlife, and humans near the Ranger mine, a public list of all "incidents" at the mine that might impact the environment, humans settlements, or be of concern to the broader public has been kept and published. Upon closure, all mine tailings will be stored permanently underground in exhausted mine pits, and the mine site reclaimed to achieve the following goals:

- Establish stable radiological conditions at the mine site to keep the radiation risk to the environment and general public, particularly local Aborigines, at the lowest level possible, while minimizing access restrictions to the area as much as is practicable.
- Prevent erosion and contour the mine site so that it resembles undisturbed landforms in the surrounding area.
- Revegetate areas disturbed by mining activities with local native species in the same density and abundance as exist in adjacent areas of Kakadu National Park, in order to create a viable ecosystem that is self regenerating and does not require human maintenance (Ref. 89).

To ensure that reclamation of the site will occur, the mine operator has deposited a bond for the full cost of reclamation with the Northern Territory Department of Mines and Energy. Furthermore the mine operator is required to annually file an updated reclamation plan and can be requested at anytime to increase the size of the reclamation bond if the Australian government determines that a larger bond is necessary to ensure full reclamation of the mine site.

Because the Ranger site lies entirely within a UNESCO World Heritage Site, it has been subject to one of the most rigorous programs of mine site environmental regulation and supervision anywhere in the world, and is under Commonwealth, Northern Territory, and Aboriginal oversight. However, recent moves to develop the neighboring Jabiluka uranium deposit, which like the Ranger Mine is not part of, but entirely surrounded by Kakadu National Park, has led the United Nations World Heritage Committee to place Kakadu National Park on its "List of World Heritage Sites in Danger" (Map 12).

Part 4: Mongolia

4.1 Mongolian Special Protected Areas

Mongolia's national special protected area system is administered by the Ministry of Nature and the Environment, and includes 4 designations of special protected areas: Strictly Protected Areas, National Conservation Parks, Nature Reserves, and Monuments. There also exist smaller systems of aimag and soum "Special Needs Lands," which are areas where development, including mining activities, is prohibited so that the land can be reserved for local uses such as haymaking or pasturage. In general, aimag and soum special needs lands occupy far smaller areas than areas protected at the national level. At present the national system of special protected areas has 48 units and occupies 20,530,588 ha, or 13.1% of national territory (Table 4, Map 13). In addition, each special protected area has a designated "buffer zone." Although not specifically prohibited, mining activities in buffer zones are subject to more rigorous environmental oversight than elsewhere, to ensure that these activities are not detrimental to the purposes for which the special protected area was created.

4.1.1 Strictly Protected Areas

Mongolia's Strictly Protected Areas are intended to preserve the original natural conditions and features of these areas in order to protect specific scientifically important traits and to ensure local environmental stability. These areas, although open to limited tourism, are largely intended to preserve land in a wild state and have designated "Pristine Zones" which are permanently closed to the general public. Two of the better known Mongolian Strictly Protected Areas are Bogd Khan Mountain Strictly Protected Area, just south of Ulaanbaatar, and the Great Gobi Strictly Protected Area in Southwest Mongolia.

4.1.2 National Conservation Parks

Mongolia's National Conservation Parks are intended to protect lands in a relatively well preserved natural state which have features of ecological, scientific, historical, cultural, and educational significance. While largely intended to preserve land in a wild state, National Conservation Parks also include designated "Travel and Tourism Zones," which are open to recreational activities compatible with the goals for which the National Conservation Park was established. Two of Mongolia's best known National Conservation Parks are Khovsgol Lake National Conservation Park, in northern Mongolia, and Altai Tavan Bogd National Conservation Park in Mongolia's far west.

4.1.3 Nature Reserves

Mongolia's Nature Reserves are intended to create conditions for the conservation, preservation, and restoration of natural features and resources. Unlike Strictly Protected Areas and National Conservation Parks, Nature Reserves are not zoned for use, and are open to ecologically compatible traditional household uses, such as gathering of non-threatened plant species. One Nature Reserve created in 1965 is the Bulgan River Nature Reserve in Khovd Aimag, which was created to protect local beaver, sable, and marten populations. The 4 different types of Nature Reserve classifications are:

- **Ecological Reserves**, intended to preserve unique, pristine ecosystems.

- **Biological Reserves**, intended to preserve rare and endangered plant and animal species as well as enhancing conditions for their reproduction.
- **Paleontological Reserves**, intended to preserve the fossil remains of ancient plants and animal in a natural state.
- **Geological Reserves**, intended to preserve unique geological formations and structures in a natural state.

4.1.4 Natural, Historical, and Cultural Monuments

Mongolia's Natural, Historical, and Cultural Monuments are intended to preserve unique natural land features, such as waterfalls, caves, and meteorite craters, in their undisturbed setting, as well as historical and cultural features of the land, such as petroglyphs, ancient burial sites, and the ruins of ancient cities. One Natural Monument is Bulgan Mountain in Arkhangai Aimag, which is an inactive volcano with a well preserved volcanic crater.

Table 4. Mongolian Special Protected Areas (as of July 1, 2000)

Protected Area Type	Number of Units	Total Area (ha)	Percentage of Mongolian National Territory
Strictly Protected Areas	12	10,494,283	6.7
National Conservation Parks	14	8,133,420	5.2
Nature Reserves	16	1,823,580	1.2
Natural, Historical, and Cultural Monuments	6	79,305	0.05
Totals	48	20,530,588	13.1

Source: Ref. 3.

4.1.5 Ramsar Wetlands of International Importance

In addition to the above protected area designations, in 1998 Mongolia joined the Ramsar *Convention on Wetlands*. Currently Mongolia has 6 sites designated as "Wetlands of International Importance" under the convention, most of which are already part of existing or proposed special protected areas (Ref. 9).

4.2 Establishing Mineral Rights on Public Lands in Mongolia

Unlike the United States, Canada, and Australia, nearly all land in Mongolia is owned by the state. As a result, Mongolia's laws for establishing rights to mineral exploration and extraction on its territory are very straight forward. The 1997 *Minerals Law of Mongolia* provides for the issue of both mineral exploration and mining licenses, which give the holder exclusive rights to explore for or mine minerals in the location designated on the license (Ref. 11). Mineral exploration and mining licenses are issued for lands open to mining by the Mineral Resources Authority of Mongolia upon payment of a fee, and are valid for the development of all minerals, coal, and building materials with the exception of petroleum, natural gas, and water. An exploration license for an area can be held up to 7 years, while mining licenses for a given area are issued for an initial term of 60 years which can be extended an additional 40 years. Licenses are issued on a first come first serve basis and are available for nearly all unoccupied public lands in Mongolia except for special protected areas, local special needs lands, and areas covered by preexisting mineral licenses. The government of Mongolia retains ownership of all minerals on Mongolian national territory, and charges royalties for the development of these minerals (Ref. 11).

Non-surface disturbing mineral prospecting may be conducted without a license anywhere within the territory of Mongolia, except in special protected areas and on other special needs lands. However, prospectors must notify the Office of Geological and Mining Cadaster and local governments of their plans, and obtain permission from local land possessors and users before engaging in any prospecting activities.

4.3 Mining and Mongolian Special Protected Areas

The pieces of Mongolian legislation relevant to the discussion of conflict between special protected areas and mining include:

- The Mongolian Law on Land
- The Minerals Law of Mongolia
- The Mongolian Law on Special Protected Areas
- The Mongolian Law on Special Protected Area Buffer Zones

4.3.1 Mongolian Law on Land

Chapter 3, Articles 18 and 19 of the *Mongolian Law on Land* define "Special Needs Lands" and the processes for designating areas as special needs land. Land designated as special needs land includes all national special protected areas, and also lands protected at the aimag or soum levels for local purposes (Ref. 10).

4.3.2 Minerals Law of Mongolia

Chapter 1, Article 4 of the *Minerals Law of Mongolia* states that "exploration and mining are restricted or precluded" on special needs lands. Chapter 1, *Article 8 of the Mineral Law of Mongolia* states that the creation of a new special needs land where valid mining exploration or extraction licenses precludes further exploration and mining in the newly declared special needs land. However, the article states that the state agency responsible for the creation of the special needs land is responsible for compensating any mineral license holders for losses (Ref. 11).

4.3.3 Mongolian Law on Special Protected Areas

Chapter 2, Article 12 of the *Mongolian Law on Special Protected Areas* prohibits exploration for natural resources, mining, and extracting sand and stone in Strictly Protected Areas. Subsequent chapters (Ch. 3, Art. 18, Ch. 4, Art. 21, Ch. 5, Art. 24) prohibit mineral exploration and extraction activities in National Conservation Parks, Nature Reserves, and Monuments (Ref. 3 and 10).

4.3.4 Mongolian Law on Special Protected Area Buffer Zones

Article 8 of the *Mongolian Law on Special Protected Area Buffer Zones* requires creation of a buffer zone management plan for the protection of plant and animal species that dwell near but not in special protected areas. Article 9 of this law requires that all entities engaging in mineral exploration or extraction within the buffer zone of a special protected area file a complete environmental impact assessment report on their activities (Ref. 3).

4.3.5 Mineral Licenses Located in Mongolian Special Protected Areas

In spite of the given legislation, conflicts between mining and Mongolia's special protected area system are already occurring, and will increase in frequency as the protected area system more than doubles in size in the near future. Based on simple visual inspection of the Mineral Resources Authority of Mongolia's mineral license map for the second quarter 2000, there were 16 mineral exploration and mining licenses that lay in part or in whole within designated special protected areas (Table 5). Four of these licenses (2226X, 2045X, 1686X, and 2293X) are mineral *exploration* licenses overlapping protected area boundaries which were issued after creation of the protected area, in violation of the *Mongolian Law on Special Protected Areas*. Three of these licenses (1438A, 1913A, and 0126A) are *mining* licenses within the boundaries of special protected areas which were issued after creation of the protected area, also in violation of the *Mongolian Law on Special Protected Areas*.

Although a number of the licenses in Table 5 have since lapsed due to completion of exploration work or for other reasons, Table 5 does give an indication of the extent of the conflicts occurring between mining activities and Mongolia's protected areas. The number of conflicts is only expected to increase as the Ministry of Nature and the Environment announces the final locations of the remaining 17% of Mongolian territory that will be proposed for protected area designation. Table 5 also serves to illustrate that *at present there is no effective legislative mechanism to eliminate current conflicts between special protected areas and the mining industry*. As the law is currently written, mining activities are prohibited in Mongolia's special protected areas. However, in order to eliminate valid mineral licenses in protected areas, the agency which created the area is responsible for compensating mining companies that hold these licenses.

The existence of 16 such licenses within protected areas in the year 2000 clearly indicates that the above described mechanism for eliminating these licenses is not working. In the case of mineral licenses that *predate* the creation of a protected area, presumably the Ministry of Nature and the Environment has no funds at present to compensate holders of these licenses, and will be unlikely to be able to do so in the foreseeable future. In the case of the 7 mineral licenses which *postdate* creation of the protected area, there are several scenarios to explain their existence:

- They are actually licenses that predate creation of the protected area but have been transferred or revised under a new license scheme and reissued with new license numbers.
- For *mining* licenses that post date creation of a protected area, presumably mine operators held exploration licenses for the same location which predated creation of the protected area. Lacking funds to compensate exploration license holders, it is assumed that the government permitted these companies to continue work in their exploration areas, and later take out a mining license on the site once exploration work was completed.
- For new commercial *exploration* licenses that post date creation of a protected area, the license has clearly been issued in violation of existing laws. Such licenses could only have been issued through some bureaucratic oversight or illegal manipulation and should be immediately withdrawn

Table 5. Mineral licenses active within Mongolian special protected areas in the 2nd Quarter, 2000. License numbers in bold type post-date creation of the protected area.

Special Protected Area	Date Created	Mineral License Number	Date Issued	License Location (Soum, Aimag)	License Type	License Holder
Onon-Baljyn Sav NCP*	April 14, 2000	2226X	April 21, 2000	Dadal, Khentii	Exploration	Troy Mongolia Alt Resources Ltd
Sylk-hemyn Nuruu NCP	April 14, 2000	0762X	October 13, 1997	Nogoon Nuur, Bayan Olgii	Exploration	Asgat Mongo Ltd
Sylk-hemyn Nuruu NCP	April 14, 2000	1248X	June 8, 1998	Ulaankhus, Bayan Olgii	Exploration	Ts. BJEK Ltd
Khan Khukhii-Khyargas Nuur NCP	April 14, 2000	2106X	February 22, 2000	Ondor./ Tsagaan., Uvs	Exploration	Cadastral Office
Tarvaga-tain Nuruu NCP	April 14, 2000	1682X	June 15, 1999	Tosontseng., Zavkhan	Exploration	Nomads Tur Ltd
Toson Khulstai NR	April 9, 1998	0135X	April 12, 1997	Khentii/ Norovlin, Khentii	Exploration	Bayan Erdes Ltd
Toson Khulstai NR	April 9, 1998	1438A	March 10, 1999	Norovlin, Khentii	Mining	Bayan Erdes Ltd
Toson Khulstai NR	April 9, 1998	0167A	May 5, 1997	Khentii/ Norovlin, Khentii	Mining	Berkh Uul TOUG
Toson Khulstai NR	April 9, 1998	0136A	December 26, 1995	Khentii, Khentii	Mining	Bayan Erdes Ltd
Toson Khulstai NR	April 9, 1998	1913A	October 29, 1999	Norovlin, Khentii	Mining	Berkh Uul TOUG
Toson Khulstai NR	April 9, 1998	2045X	January 10, 2000	Norovlin, Khentii	Exploration	Niamdorj Lkhanaa-giin
Yakhi Nuur NR	April 9, 1998	0237A	June 12, 1997	Dashbalbar, Dornod	Mining	Tov Asia Uran Ltd.
Khar Us Nuur NCP	June 13, 1997	1686X	June 15, 1999	Chandman, Khovd	Exploration	Mongol Gazar Ltd
Khangai Nuruu NCP	May 28, 1996	0077X	July 17, 1996	Bat Olziit, Ovorkhangai	Exploration	Mongol Gazar Ltd
Altai Tavan Bogd NCP	May 28, 1996	2293X	May 12, 2000	Altai, Bayan Olgii	Exploration	Mongolin Alt (MAK) Ltd
Small Gobi SPA	May 28, 1996	0126A	July 20, 1996	Nomgon, Omnogobi	Mining	Och Impex Ltd

Source: Mineral Resources Authority of Mongolia.

* NCP = National Conservation Park, NR = Nature Reserve, SPA = Strictly Protected Area

Anecdotally, stories abound in Mongolia of special needs land being manipulated by officials to assist mining interests, and in one rare case to deter mining interests. Such stories include an area being "deprotected" to permit gold mining, and another area being declared "protected" by a government official, causing a company holding a valuable exploration license in the area to relinquish their license. After the license was relinquished, the same official declared the area "deprotected" so that the relinquished license could be obtained by a "favored" investor. At Zaamar Soum¹, site of Mongolia's most valuable gold fields, the local governor attempted to declare the entire soum a special needs area because the locals were suffering the most under the effects of bad mining practices, but not directly receiving royalties from the gold extracted on their traditional lands (see case study). While unsuccessful in declaring the entire soum special needs land, the Zaamar Soum governor did succeed in declaring 25% of the soum special needs land, which is now off limits to mineral exploration and mining. In other cases, at least one mining company and numerous individual miners are reported to have illegally entered the Khan Khentii Strictly Protected Area to explore and mine for gold.

To compound the problems caused by mineral activities in Mongolia's special protected areas, holders of valid licenses within protected areas often neglect to tell relevant authorities of their work plans, particularly protected area rangers. Thus these companies fail to determine whether their mineral activities they are engaged in will be detrimental to the purposes for which the protected area was established, and make no effort to coordinate their activities with local rangers to minimize the impact of mining on the local environment, flora and fauna.

4.4 Case Study: Zaamar Soum Gold Mining District, Mongolia

To date the Mongolian mining industry as a whole has demonstrated gross neglect of its environmental obligations, and Mongolian environmental laws pertinent to the mining industry go largely unenforced. Existing fines are small compared to mining profits, and do little to deter mine operators from engaging in environmentally unsound practices. Mine inspections occur only intermittently, as there are not enough trained inspectors and funds to perform inspections on a regular basis. Thus fears that the mining operations located in or near Mongolia's special protected areas will cause irreparable damage to these areas is entirely justified.

One example of poor environmental management of mines in Mongolia is the case of Zaamar Soum, Mongolia's most valuable gold field. The Zaamar Soum gold mining district is located in the Tuul River Valley, western Tov Aimag, and occupies an approximately 50 km long stretch of the valley (Map 14). Large scale placer gold mining operations began in the area in 1995, and currently there are about 20 mining operations producing 5000 kg of placer gold annually, or roughly half of Mongolia's annual gold

¹ A "soum" is a Mongolian administrative unit that is the largest subdivision of an "aimag," or province, and generally includes several villages.

production. In addition to the approximately 20 active mines, there are about 20 further license areas that are not actively being mined.

A number of major environmental problems result from placer mining as conducted at Zaamar Soum, most of which could be remedied for a minimal investment. However, until fines for violation of environmental laws exceed the cost of implementing solutions to these problems, mining companies operating at Zaamar are unlikely to voluntarily take measures to meet their environmental obligations. Some of the major environmental shortcomings of mine operations at Zaamar Soum include:

- Operating placer mine wash plants while settling ponds are completely full instead of cleaning the ponds at regular intervals. The result being that sediment laden wash plant water is sent directly back to the Tuul River untreated for many weeks of the mining season.
- Leaving high volume water monitors on for many hours of the day when they are not in use, unnecessarily filling settling ponds with unused water and sediment eroded from tailings piles by the unused water.
- Refusal of mine operators to perform reclamation in a "reasonable amount of time," generally considered to be 1 year. In doing so, mining operations are creating barren wastelands from formerly productive pastures, and are destabilizing river and stream channels.
- Performing inadequate reclamation involving only backfilling of mine pits without properly replacing topsoil and revegetating the area. Even after several years mine sites at Zaamar "reclaimed" in this manner only sustain a sparse cover of a few species of weeds which local livestock avoid eating.
- Generally poor mine design, layout, and practices, such as inadequate topsoil storage and failure to salvage large woody plants, especially willows, for reclamation (Ref. 15).

The results of poor mining practices in Zaamar Soum have been the:

- Unnecessary destruction of hundreds of hectares of much needed prime grazing lands.
- Chronic erosion.
- High levels of sediment contamination of Tuul River water.
- Severe damage to the fauna, flora, and geomorphic stability of the Tuul River Valley.

Environmental oversight of the 20 or so gold mining operations at Zaamar Soum is left in large part to a soum environmental inspector who has neither training in mining environmental issues nor a vehicle to inspect the mines with. To further exacerbate the problem, the inspector's office is located approximately 40 km from the mining area,

across a large mountain range. Thus environmental oversight in Zaamar Soum is highly ineffective and mine operators make little effort to fulfill their environmental obligations.

One example of poor environmental practices at Zaamar is that of the Shijur Alt mine, which operates a large gold dredge that floats on an artificial pond excavated into the Tuul River floodplain. The dredge operates in such a way that fine sediments are returned to the pond first, and then overlain by up to several meters of coarse fraction and large rock. In doing so, the operation destroys a valuable reclamation resource, fine sediment, and reduces the original grassy flood plain to irregular mounds of coarse material devoid of topsoil. Thus highly productive and reliable floodplain pasture is converted to mounds of barren gravel, making effective revegetation of the surface extremely difficult. Although required to reclaim their mine site to an ecologically productive state, like many other companies Shijur Alt has refused to do so. In justification, the company has stated that their gold separation technology is so inefficient that their mine tailings could be profitably remined with the more modern gold separation technologies that are available. Yet even though a pioneer in large scale placer gold production in Mongolia and one of the country's four largest gold producers, after several years of highly profitable operation Shijur Alt has made no move to obtain improved gold separation technologies, remine their tailings, or reclaim their mine site as required by law.

The large scale, and largely preventable destruction of the environment by northern Mongolia's placer mining industry was brought to the attention of the World Bank, which funded a study and conference on environmental problems of placer gold mining at Zaamar. However at the close of the conference, one official of Shijur Alt publicly stated that mine reclamation was unnecessary because it would occur "naturally," with topsoil, and grass seeds being blown on the wind to Shijur Alt's mine site, restoring it to productive grazing land. While this may be true on a time scale of hundreds to thousands of years, it is an entirely erroneous statement on the time scale of returning mined land to a productive state within a reasonable amount of time, as required by law. Like many placer mining operations in Zaamar Soum, Shijur Alt is in the process of converting some of Zaamar Soum's most productive grazing lands into barren wastelands that may not sustain pastures for centuries if left in an unreclaimed state. Importantly for mine operators, this so called process of "natural reclamation" will in no way satisfy their legal obligation to properly reclaim their sites in a reasonable amount of time.

Thus if even a highly profitable mine like Shijur Alt can not be compelled to fulfill their environmental obligations, there is little hope of getting the many smaller, less efficient, less profitable mine operations to mitigate the environmental damage they cause. As the first large scale gold producer at Zaamar Soum, Shijur Alt should be a model for all mine operations in the area. However given that the company has publicly stated that its environmental obligations will be fulfilled "naturally" there appears to be little chance that the company will ever implement environmental protection measures without direct pressure to do so from the government of Mongolia.

The general widespread destruction of formerly productive pastures, lack of mine reclamation, and dumping of inadequately treated mine waste water into Northern

Mongolia's rivers is by no means limited to Shijur Alt, but are problems affecting to some extent virtually every gold mining operation in Northern Mongolia. Not even simple, internationally accepted, environmental protection measures are taken at Zaamar, such as installing recycle pumps to reuse wastewater, turning off pumps to save water when not in use, and cleaning settling ponds when they are full (Ref. 14 and 15). Although laws exist which address these environmental issues, to date enforcement of Mongolia's environmental laws concerning mining has been highly ineffective, and the industry has done little to voluntarily fulfill its environmental obligations. Zaamar's gold fields are presently producing about 5000 kg of gold per year with a gross value of approximately US \$40 million annually. Although the government of Mongolia generates about US \$5 million a year from royalties and taxes on gold produced at Zaamar, and further revenues from taxes on corporate profits, there is not a single adequately trained and equipped full time environmental inspector for Zaamar Soum's 20 gold mines, even though they are located only a half day's drive from the capital, Ulaanbaatar.

Thus environmental regulations concerning the mining industry presently go unenforced for lack of funding, equipment, and trained manpower at Zaamar Soum, in spite of the area being both Mongolia's most lucrative gold mining district and easily accessible from Ulaanbaatar. Rangers at special protected areas in the remote corners of the country have even less in the way of funding, training, and equipment, than the environmental inspector at Zaamar Soum. Given the present situation, it will be extremely difficult for these rangers to effectively hold miners working in protected areas to the higher environmental protection standards necessary to prevent permanent damage to sensitive protected area ecosystems. With consideration of the present state of enforcement of environmental laws concerning mining in Mongolia, the applicability to Mongolia of American, Canadian, and Australian mining and protected area policies can be evaluated.

Part 5: Conflict Resolution

5.1 Approaches to Mining and Special Protected Area Conflict Resolution

As discussed above, the nine basic approaches to resolving conflicts between mining and special protected areas in the United States, Canada, and Australia, are (Table 6):

- **Approach 1:** Complete prohibition of new mines and new mineral claims in designated special protected areas (USA, CAN, BC, AUS, NSW)².
- **Approach 2:** Elimination of mineral claims through land trades for unprotected lands of high mineral resource potential (USA, BC).
- **Approach 3:** Immediately grant protected status to all lapsed mineral claims within special protected areas (USA, CAN, BC, AUS, NSW, WA).
- **Approach 4:** Elimination of mineral claims in special protected areas through fair compensation for a mining firm's investment in a claim - but not for the speculative value of minerals in the claim (USA, BC).
- **Approach 5:** Elimination of claims in special protected areas through voluntary forfeiture in exchange for positive corporate publicity to improve a company's environmental image and public relations (USA, CAN, BC, AUS, NSW, WA).
- **Approach 6:** Make claims of marginal profitability within special protected areas financially unprofitable by placing prohibitively expensive environmental protection requirements on their development over what would be required on unprotected lands (USA, CAN, BC, AUS, WA).
- **Approach 7:** Temporarily redraw boundaries for new special protected areas to exclude mineral claims, possibly creating "islands" of unprotected land within protected areas, or "Swiss Cheese" protected areas. However subject mineral exploration and mining on these unprotected "island claims" within protected areas to the strictest of environmental controls, and only permit the activity if it is thought that it can be conducted without compromising the purposes for which the protected area was created. Immediately reclaim and incorporate all lapsed mineral license areas into the protected area. (CAN, BC, AUS, NSW).
- **Approach 8:** Permit exploration and mining on valid mineral claims within new special protected areas, but at all times treat the mineral claims as integral parts of the protected area. However subject mineral exploration and extraction on claims within protected areas to the strictest of environmental controls, and only permit the activity if it is thought that it can be conducted without compromising the purposes for which

² USA= United States, CAN = Canada, BC = British Columbia, AUS = Australia, NSW = New South Wales, WA = Western Australia

the special protected area was created. This policy can result in "Swiss Cheese" protected areas," with "islands" in special protected areas where mining is permitted. Immediately reclaim and incorporate all lapsed mineral license areas into the protected area. (USA, WA).

- **Approach 9:** Leave all special protected areas open to mineral exploration and mining, effectively "deprotecting" them, but still call them protected areas (WA).

5.1.1 Applicability of Conflict Resolution Approaches 1-9 to Mongolia

APPROACH 1:

Completely prohibit new mineral exploration and mining in special protected areas.

Successfully Applied By:

The United States, Canada, British Columbia, Australia, New South Wales.

Advantages for Mongolia:

- If enforced, completely prevents all future mineral exploration and mining activities in special protected areas.
- An internationally accepted approach that is used by the central governments of three of the world's largest developed nations, thus is highly defensible.
- This approach is presently required by *the Mongolian Law on Special Protected Areas*.

Disadvantages for Mongolia:

- The Mongolian mining industry will argue that many as yet undiscovered mineral deposits in special protected areas will go undeveloped.
- The *Mongolian Law on Special Protected Areas* law appears to not be uniformly enforced in certain cases (Table 5).

Discussion:

For **Approach 1**, the *Mongolian Law on Special Protected Areas*, which prohibits *all* mineral exploration and extraction in special protected areas, is in full agreement with American, Canadian, and Australian policies prohibiting the establishment of new mineral claims in their protected areas. However, should the 2nd Quarter 2000 Mineral Resources Authority of Mongolia Mineral License Map be visually accurate, it appears that at least 7 mineral exploration and extraction licenses have been issued which lie partially or wholly within the boundaries of preexisting protected areas, in clear violation of the protected area law. Thus Mongolia must develop a mechanism to prevent further issuance of new mineral licenses in established special protected, and immediately withdraw all licenses issued in violation of this law.

APPROACH 2:

Eliminate valid preexisting mineral exploration and mining licenses in special protected areas by land trades for unprotected lands.

Successfully Applied By:

The United States, British Columbia.

Advantages for Mongolia:

- Can reduce or even eliminate the need to pay compensation to mining companies whose licenses are invalidated by the creation of new special protected areas. This would be highly beneficial to Mongolia because mining operations could be completely eliminated from a special protected area at minimum expense to the government.
- Could reduce possible corruption resulting from speculation in mineral licenses in proposed special protected areas that might occur if these licenses were eliminated through compensation.

Disadvantages for Mongolia:

- At present mineral licenses are relatively inexpensive and there is no private ownership of large tracts of land in Mongolia, giving mining companies little incentive to agree to land trades.

Discussion:

Approach 2, trading preexisting mineral licenses within new special protected areas for other unprotected mineral rich locations, has been used effectively in both in the United States and British Columbia (see case studies). In the New World Mine Case Study, it was seen that the United States government is prepared to aggressively defend its special protected areas from environmental threats due to mining, even if the mine is located in the buffer zone of the protected area. Although the boundaries of the New World Mine site were originally drawn to exclude it from the surrounding protected areas specifically because of its rich mineral wealth, permission to mine the site was later revoked by the American government when it became apparent that the mine operation posed a large environmental threat to Yellowstone National Park. Instead, the mine site was acquired by the American government and given special protected area status in exchange for other unprotected federal lands. In the case of the Windy Craggy Mine in British Columbia, development of what would have been the largest copper mine in the western hemisphere was blocked by the government of British Columbia because of the large potential for damage to wildlife habitat. Instead, the site was exchanged for other lands in British Columbia and compensation.

Presently, the Mongolian government lacks the financial resources to compensate firms for investments in mine sites located within newly created protected areas. Thus land trades for sites on unprotected lands that have not been proposed for protection are probably Mongolia's best current option for eliminating mineral licenses within special protected areas. However, given the low price of exploration and extraction licenses, which currently are US \$0.05/ha and US \$5.00/ha for the initial year respectively, land trades may not be an attractive option for mine operators unless land privatization occurs, allowing them to hold surface and subsurface rights to the land on a long term basis (Ref. 11). In the meantime, lapsed mineral licenses with proven reserves on unprotected lands can be held in a public trust as a reserve pool for conducting trades to eliminate mineral licenses within protected areas. Other land trade dependent dispensations can be devised on a case by case basis to encourage surrender of mineral licenses within protected areas. Such dispensations could include granting long term licensing conditions on lands received in trade, or even granting special tax dispensations.

APPROACH 3:

Immediately grant protected status to all lapsed mineral licenses within special protected areas.

Successfully Applied By:

The United States, Canada, British Columbia, Australia, New South Wales, Western Australia.

Advantages for Mongolia:

- Automatically eliminates mineral licenses in special protected areas in a non-confrontational manner as mining companies terminate work, abandon their license areas, or default on annual license payments.
- An internationally accepted approach that is used by the central governments of three of the world's largest developed nations, thus is highly defensible.

Disadvantages for Mongolia:

- The mining industry will argue for the right to buy out or otherwise transfer ownership of lapsed mineral licenses within special protected areas, thus indefinitely extending them.

Discussion:

Approach 3, immediately granting protected status to all lapsed mineral claims within or earlier excluded from a protected area, is more or less automatic for claims in protected areas in the United States, Canada, and Australia. Thus "Swiss Cheese" type mine sites within or along the boundaries of special protected areas, such as the Ranger uranium mine in Australia, will immediately revert to protected status as soon as mining at the site ceases (see case study). This should be general policy for mineral licenses within Mongolia's special protected areas, and all transfer of mineral licenses within protected areas which would extend the life of a license should be prohibited. Furthermore, the State of New South Wales also reserves the right to decline to extend mineral licenses in special protected areas which are legally held by their original holder.

APPROACH 4:

Eliminate valid preexisting mineral exploration and mining licenses in special protected areas by paying compensation for a mining company's investment in a license area, but not for the speculative value of the minerals on the site.

Successfully Applied By:

The United States, British Columbia

Advantages for Mongolia:

- Compensation is generally one of the methods for eliminating mining licenses in special protected areas that is most acceptable to mining companies.

Disadvantages for Mongolia:

- At the present time Mongolia has no funds to even adequately *inspect* mineral license sites, let alone compensate companies for their large investments in their mineral license areas.
- This method would open the door to speculation in mineral licenses in proposed special protected areas, and could lead to rampant corruption such as companies seeking compensation for mineral licenses that they never intended to develop.

Discussion:

Approach 4, elimination of mineral licenses within special protected areas by compensating a company for its investment in a license area, should be highly discouraged in Mongolia for the simple reason that the government lacks funds to pay compensation. While the governments of the United States and Canada are well endowed enough to compensate mine operators for their investments in mineral claims located in new special protected areas, the government of Mongolia is financially incapable of exercising this option at the present time. Although Chapter 1, Article 4 of the *Minerals Law of Mongolia* states that creation of a special protected area precludes the exercising of mining rights in that area, it appears that the government lacks funds to compensate holders of valid mineral licenses within newly created protected areas, and these mining activities are being allowed to proceed. Evidence of this can be found in the issue of at least 3 mineral extraction licenses inside the boundaries of established protected areas since July of 1996 (Table 5). The Mongolian Ministry of Nature and the Environment, which is responsible for creating special protected areas, is presently incapable of providing adequate compensation for mineral licenses as directed by the *Minerals Law*, and another mechanism must be established to eliminate mining claims in newly established protected areas.

Furthermore, extinguishing mineral licenses in special protected areas through compensation risks the danger that many unethical companies will begin speculating in mineral licenses in proposed protected areas, in hopes of profiting through government compensation. In one easily imagined scenario, a rush would be made to obtain mineral licenses in *proposed* special protected areas, fraudulent compensation claims would be filed which overstate development expenses, and companies would profit when the government extinguished these licenses through compensation. The agencies that would be responsible for verifying claimed development expenses in such a scenario are already underfunded, and would be unlikely to have the resources to determine whether or not a compensation claim has been inflated. As discussed in the third approach, a less fraud prone mechanism for eliminating mineral licenses in special protected areas would be land trades. In the event that monetary compensation for a mineral license is granted, it should be limited to expenses incurred in site development. Under no circumstances should compensation be granted for the speculative value of minerals on a mineral claim within a special protected area, as this would lead to larger scale fraud than simple compensation for development expenses.

APPROACH 5:

Eliminate valid preexisting mineral exploration and mining licenses in special protected areas through voluntary forfeiture in exchange for positive corporate publicity to improve a company's environmental image and public relations.

Successfully Applied By:

The United States, Canada, British Columbia, Australia, New South Wales, Western Australia.

Advantages for Mongolia:

- An ideal, non-confrontational way to eliminate mineral licenses in special protected areas that will improve any mining company's public image and save the government of Mongolia the tremendous expense of paying compensation.

Disadvantages for Mongolia:

- At present there is little public outcry in Mongolia against mining companies which fail to fulfill their environmental obligations, and hence little motivation for mining companies to improve their public image by voluntarily forfeiting mineral licenses in protected areas.

Discussion:

Approach 5, voluntary forfeiture of mineral claims within new special protected areas for the sake of good corporate public relations, although the most ideal approach for Mongolia, is unlikely to be exercised to any significant extent at this time. This is partly due to the fact that many highly destructive mines in Mongolia are small operations that feel they have no responsibility to fulfill their environmental obligations and are under no pressure to be good corporate citizens. While in the United States, Canada, and Australia, there are many outspoken, highly organized, and extremely effective environmental groups that voluntarily perform much needed oversight of mining company activities, at present in Mongolia there is no such counterbalance to the mining industry. Mining companies in Mongolia operate with minimum governmental oversight and have yet to receive widespread negative publicity from environmental groups, thus there is no motivation to improve corporate public image by voluntarily relinquishing mineral claims in protected areas. One source of motivation to do so could be a national media campaign publicizing such environmentally friendly gestures on behalf of the mining industry in both the print and electronic media.

APPROACH 6:

Make valid mineral licenses of marginal profitability in special protected areas unprofitable by requiring prohibitively expensive environmental protection measures, thus forcing their abandonment.

Successfully Applied By:

The United States, Canada, British Columbia, Australia, and Western Australia.

Advantages for Mongolia:

- It is internationally accepted by the central governments of three of the world's largest developed nations that exceptionally high environmental protection standards must be met by mining companies operating in environmentally sensitive special protected areas, thus the approach is highly defensible.

Disadvantages for Mongolia:

- Mongolia is presently unable to enforce far less rigorous environmental protection standards in its most productive gold fields near the capital, such as in Zaamar Soum. Thus it is unlikely that higher standards of environmental protection necessary to force closure of marginally profitable mines operating in remote protected areas could ever be implemented.

Discussion:

Approach 6, making marginal claims in special protected areas unprofitable by requiring prohibitively expensive environmental protection measures, would at first glance seem highly appropriate for Mongolia. However, at present the Mongolian government lacks resources to adequately enforce environmental protection measures in the nation's most valuable gold fields, which lie only a half day's drive from the capital. Thus there is little hope of enforcing existing regulations, let alone special environmental requirements, at isolated mines in remote protected areas. Mineral deposits of marginal profitability that will do little to benefit the nation as a whole should be uniformly prohibited from being developed in special protected areas, regardless of whether or not a valid right to do so exists. Mining of such deposits has a large potential to cause significant damage to sensitive protected area ecosystems while benefiting only a limited number of mine employees, and should be prevented. Again, one possible method of eliminating these licenses is Approach 3, land trades.

APPROACH 7:

Temporarily redraw special protected area boundaries to exclude areas of high mineral wealth, possibly creating "islands" of unprotected land within protected areas, or "Swiss Cheese" protected areas. Hold mining operations in these "island" license areas to rigorous environmental protection standards while operating. Immediately reclaim these license areas and incorporate them into the protected area when mineral activities terminate.

Successfully Applied By:

Canada, British Columbia, Australia, and New South Wales

Advantages for Mongolia:

- Permits the creation of special protected areas in spite of the presence of economically valuable mineral deposits.
- Provides guarantees that damage to the ecological integrity of special protected areas from mineral exploration and mining operations will be minimized.

Disadvantages for Mongolia:

- "Swiss Cheese" protected areas can result in habitat fragmentation with elevated levels of human disturbance and invasive species, and also decreased biodiversity of flora and fauna, particularly of large mammals and birds.
- Mongolia is presently unable to enforce far less rigorous environmental protection standards in its highly productive gold fields near the capital, such as in Zaamar Soum. Thus it is unlikely that higher standards of environmental protection necessary to safeguard the ecological integrity of remote protected areas could ever be implemented.

Discussion:

Discussed under Approach 8, which differs primarily in terminology.

APPROACH 8:

Permit mining companies to operate on preexisting mineral exploration and mining license areas within special protected areas, but at all times treat mineral claims as integral parts of the protected area. Hold these mining operations to rigorous environmental protection standards while operating. Immediately reclaim and incorporate these license areas into the protected area when mineral activities terminate.

Successfully Applied By:

The United States, Western Australia

Advantages for Mongolia:

- Permits the creation of special protected areas in spite of the presence of mineral licenses and economically valuable mineral deposits.
- Provides guarantees that damage to the ecological integrity of a special protected area from mineral exploration and mining operations will be minimized.

Disadvantages for Mongolia:

- "Swiss Cheese" protected areas can result in habitat fragmentation with elevated levels of human disturbance and invasive species, and also decreased biodiversity of flora and fauna, particularly of large mammals and birds.
- Mongolia is presently unable to enforce far less rigorous environmental protection standards in its highly productive gold fields near the capital, such as in Zaamar Soum. Thus it is unlikely that higher standards of environmental protection necessary to safeguard the ecological integrity of remote protected areas could ever be implemented.

Discussion:

Approaches 7 and 8 are essentially the same, but with minor differences in terminology. In Canada and Australia it is possible to create "islands" of unprotected land within new special protected areas, where mining may be permitted. Even though entirely surrounded by the protected area, these "island" mineral claims are not considered to be part of the protected area. In Australia, this can be done in the midst of a protected area, as in the case of Kakadu National Park, while in Canada this approach is usually only implemented along the boundaries of protected areas. In the United States, mineral claims can exist as "islands" within new special protected areas. However, even during mining operations the claims are considered to be an integral part of the protected area, and inspections and setting of rigorous, site-specific environmental protection requirements are the responsibility of the agency administering the protected area.

While the mining industry in Mongolia will undoubtedly find approaches 7 and 8 ideally suited for Mongolia, it should be obvious from the example of the Zaamar gold fields that these approaches are in no way implementable in Mongolia at present. In the United States, Canada, and Australia, such islands of mineral activities within protected areas are subject to frequent inspections and rigorous environmental monitoring of the surrounding area at daily, weekly, monthly, and annual time scales. Such monitoring includes laboratory analysis of a mining operation's effects on air, water, soil, flora, fauna, and sometimes even the human population (see Kakadu case study). Furthermore, mining companies operating on such claims are subject to special environmental requirements such as installing camouflage to hide operations, bans on night lighting, restrictions on noise levels, and transporting all mine wastes out of the protected area (discussed in previous sections).

The current environmental inspector in Zaamar Soum does not have proper training, equipment, a laboratory, or even transportation to Mongolia's richest gold fields. Not even the simplest monitoring of suspended sediment in mine effluent is performed at Zaamar, even though the test only requires a single piece of equipment available for US \$20 (Ref. 15). It is difficult to imagine how even more inadequately trained rangers in Mongolia's remote protected areas could compose, let alone implement, the necessarily rigorous environmental requirements for mines operating under their jurisdiction. Clearly the model of long term, continuous, intensive, environmental monitoring of contamination and ecology such as conducted at the Ranger Uranium Mine in Kakadu National Park is unfeasible in Mongolia due to lack of trained staff, analytical facilities, and funding. Thus the intensive environmental protection measures necessary to safeguard Mongolia's protected areas from internal ecological damage due to mining simply can not be implemented at this time.

Another case illustrating the inability of local authorities to enforce Mongolia's existing environmental legislation is that of the Tavan Bogd National Conservation Park. Recently officials were unable to prevent initiation of an unauthorized, but nationally publicized, hydroelectric project in the buffer zone of that park, let alone force the project sponsor to file the required environmental impact assessment report (Ref. 16). Given the current lack of enforcement of Mongolia's existing environmental laws and the mining industry's unwillingness to voluntarily fulfill their environmental obligations, approaches 7 and 8 should for all intents and purposes be considered impossible to implement. These approaches will continue to be unimplementable in Mongolia's protected areas until there are adequate resources to:

- Compose *site-specific* environmental regulations.
- Hire trained staff to perform weekly inspections and enforcement of environmental regulations.
- Purchase equipment and facilities for conducting the necessary analytical environmental lab work.
- Force the Mongolian mining industry to fulfill their environmental obligations as required by law.

In the event that Mongolia should attempt to implement approaches 7 or 8 at some future time, all costs of environmental monitoring, environmental protection measures, and reclamation of mine sites within protected areas should be paid for by the mine operators themselves. If unable to do so and earn a profit, the mine should not be permitted to open. Furthermore, mine operations in special protected areas should not even be considered unless the revenues generated from the mine are going to be of significance to the national economy at a level comparable to those generated by the Erdenet copper mine.

Finally, approaches 7 and 8 should be discouraged because of the fact that "Swiss Cheese" type protected areas containing internal "islands" of mineral activities are not ecologically sustainable on a long term basis. Such management plans can lead to destruction of prime wildlife habitat in the most remote sections of a protected area, while the opening of transportation corridors to mine sites creates avenues for species invasion and increased human disturbance. In general such management plans lead to habitat fragmentation, formation of genetically isolated islands, and decreased biodiversity. Again, such island licenses in Mongolia should be eliminated through land trades for mine sites on unprotected lands, if at all possible.

APPROACH 9:

Leave all special protected areas open to mineral exploration and mining but still call them protected areas.

Applied By:

Western Australia

Advantages for Mongolia:

- This approach has no advantages for Mongolia's protected areas, but is the approach preferred by mining companies.

Disadvantages:

- Effectively "deprotects" all special protected areas, making the creation of special protected areas an almost meaningless activity.
- "Swiss Cheese" protected areas can result in habitat fragmentation with elevated levels of human disturbance and invasive species, and also decreased biodiversity of flora and fauna, particularly of large mammals and birds.
- May cause Mongolia's lenders and the broader international community to question Mongolia's commitment to protecting its unique environment, and leave Mongolia open to international criticism should mining in special protected areas result in a large scale accident or contribute to extinction of prominent species.
- Widespread mining in Mongolia's special protected areas will inevitably result in a decrease in tourism to the country, and thus a loss of a much needed alternative source of income for rural populations.

Discussion:

Approach 9 is unique in this study to the state of Western Australia, and leaves all of the state's special protected areas open to consideration for mineral exploration and extraction. Thus at first reading, special protected area designation in Western Australia would appear to have little meaning at the present time. However even in the most permissive environment concerning mining, the following are required before mining activities can proceed in one of Western Australia's special protected areas:

- An environmental impact assessment conducted by the state Environmental Protection Authority - not a private contractor in pay of a mine operator.
- The approval of the state Minister for the Environment.
- The approval of the state Minister for Mines.
- The approval of both houses of the Western Australian state parliament

Furthermore, it is understood that Western Australia's most scenic and ecologically important areas are off limits to mineral development in perpetuity.

As elsewhere, mine operations within Western Australia's special protected areas are held to far higher environmental protection requirements, and mine operations are largely limited to boundary zones of protected areas. Finally even the outspokenly pro-mining manager of the Environmental Protection Branch of Western Australia's Department of Conservation and Land Management is of the opinion that mining in protected areas should be limited to sites where "the (mineral) product is of strategic importance or the ore body is so valuable as to be of economic significance to the state or nation" (Ref. 84).

In the context of Mongolia, even Western Australia's policies, which lie far out of the mainstream of international policy on mining in special protected areas, would place most of Mongolia's special protected areas off limits to mining due to the scenic and ecological importance of these areas. If adopted, such policies would only recommend new mining in special protected areas if there were a mineral discovery of "Erdenet" proportions and importance to the national economy. Such a policy would effectively prohibit all small inefficient mines, which benefit only a limited number of employees, from operating in special protected areas. The environmental damage from such small mines often exceeds their economic benefits, and these types operations would quickly become financially unviable if forced to comply with the severe environmental protection measures that are necessary to preserve protected area ecosystems.

Given that a protected area effectively becomes "deprotected" and begins to lose its ecological integrity as soon as a large mine operation begins, adoption of Approach 9 in Mongolia is strongly discouraged. Furthermore Approach 9 is currently in violation of the *Mongolian Law on Special Protected Areas* which prohibits mineral exploration and mining in protected areas. If new mining were permitted in special protected areas, short term exploitation of mineral resources would come at the expense of protection of one of Mongolia's most potentially valuable resources, its wild places.

Table 6: Summary of approaches to mining and protected area conflict resolution.

Approach Number and Description	Regions Where Used	Appropriate for Mongolia at Present Time
1. Prohibit New Mines by Law in SPAs*	USA, CAN, BC, AUS, NSW**	YES (Required by Mongolian Law)
2. Eliminate Mineral Licenses in SPAs by Land Trades and Other Dispensations	USA, BC	YES
3. Immediately Protect all Lapsed Mineral Licenses in SPAs	USA, CAN, BC, AUS, NSW, WA	YES
4. Eliminate Mineral Licenses in SPAs by Compensation	USA, BC	NO (Required by Mongolian Law)
5. Eliminate Mineral Licenses in SPAs by Voluntary Forfeiture	USA, CAN, BC, AUS, NSW, WA	YES
6. Make Claims in SPAs Unprofitable with Rigorous Environmental Protection Requirements	USA, CAN, BC, AUS, WA	NO
7. Temporarily Redraw New SPA Boundaries to Exclude Mineral Licenses	CAN, BC, AUS, NSW	NO
8. Allow Mining with Rigorous Environmental Protection Requirements in New SPAs	USA, WA	NO
9. Leave All Protected Areas Open to Mining	WA	NO

* SPAs = Special Protected Areas

**USA= United States, CAN = Canada, BC = British Columbia, AUS = Australia, NSW = New South Wales, WA = Western Australia

5.2 Discussion of Conflict Resolution

In summary, general approaches to resolving conflicts between special protected areas and mineral exploration and mining that are ideally suited for Mongolia at the present time include:

- **Approach 1**, prohibit all new mineral exploration and mining activities in protected areas.
- **Approach 2**, land trades and special dispensations in exchange for mineral licenses in special protected areas.
- **Approach 3**, immediately grant protected status to all lapsed mineral licenses within protected areas.
- **Approach 5**, voluntary forfeiture of mineral licenses in special protected areas in exchange for positive corporate publicity.

Methods of conflict resolution commonly used in affluent countries that will be difficult to apply in Mongolia include:

- **Approach 4**, compensation in exchange for mineral licenses in special protected areas. This is highly problematic due to Mongolia's lack of financial resources to compensate license holders and the likelihood that unscrupulous speculation in mineral licenses in protected areas will occur as a result of such a policy.
- **Approaches 6, 7, and 8**, permit development of preexisting mineral licenses in new protected areas, but require these operations to implement potentially prohibitively expensive environmental protection measures. These approaches are highly problematic due to the current difficulty in even enforcing ordinary environmental protection measures at mines on unprotected lands in Mongolia, a result of lack of funding to hire, train, and equip personnel to enforce environmental legislation.

Approach 9, leaving all special protected areas open to new mining activities, effectively "deprotects" all protected areas and should not be considered.

In the American case study, development of a valuable gold deposit in a protected area buffer zone was blocked because of fears of environmental degradation of the protected area downstream of the deposit. In this case, the long term benefits derived from the natural features of Yellowstone National Park in their undisturbed state were considered of more value than a mineral deposit estimated to be worth US \$800 million. Given that over 3.1 million tourists visited Yellowstone National Park in 1999, supporting dozens of communities around the park, it was a very easy to make an argument against the mine (Ref. 23). In the Canadian and Australian case studies, discovery of valuable mineral deposits led to the creation of special protected areas to preserve the rare natural and cultural features surrounding these deposits. In the Canadian case study, the government of Canada felt the combined long term benefits of permanent wildlife habitat, multi-million dollar a year ecotourism, the commercial salmon fishing industry, the ecological integrity of neighboring World Heritage sites, and continued good relations with its

American neighbors were of more value than what would have been derived from the western hemisphere's largest copper mine. In Australia, the need to preserve natural and cultural values of lands surrounding a valuable mineral deposit was considered important enough to cause the creation of a new special protected area to prevent future expansion of mining activities in the area. Furthermore, one of the world's most rigorous environmental monitoring programs was implemented to prevent the mine from causing environmental degradation of the new protected area, which completely surrounds the mine.

Many of the measures taken to protect lands from mining activities discussed in the above case studies will prove prohibitively expensive for implementation in Mongolia, as is clearly demonstrated by the lack of funding for even a single full time inspector to monitor the twenty gold mines in Zaamar Soum. However, there are still many lessons to be learned from these case studies. For example, in the Australian case study, the mine operation in Kakadu National Park is being held responsible for the cost of financing complex environmental protection measures, and would have to close if it could not finance environmental protection and still remain profitable. Analogous to the American and Canadian case studies, most of Northern Mongolia's mines lie upstream of a UNESCO World Heritage Site, Lake Baikal. The value of continued preservation of this world treasure, as well as Northern Mongolia's aquatic resources and good relations with Mongolia's Russian neighbors must be considered when evaluating the economic benefits and environmental performance of Northern Mongolia's mines. In the event of a large scale mining accident in Mongolia's Lake Baikal watershed, such as the failure of the new Boroo Gold Mine's cyanide tailing ponds in the event of an earthquake or flood, the event could possibly be an embarrassment to the Mongolian government and its lenders for decades to come.

In the publication *Special Protected Areas of Mongolia*, it has been stated that attempts to create protected areas in the pristine Tengis and Shishkhed river basins in Khohvsgol Aimag's Darhat Depression have been blocked due to the existence of several mineral exploration licenses of large areal extent (Ref. 3). The vast size of these exploration claims is probably due to the low initial cost of these licenses. However, in conformance with the Canadian and Australian practices, it might be wise to declare the area protected and temporarily exclude final mineral extraction license areas from the protected area. Mines within the newly declared protected area could be held to higher environmental standards, and all lapsed mining license areas could be immediately incorporated into the protected area as mining activities terminate.

Finally, many conflicts between mining and special protected areas could be resolved by simply making boundaries of *proposed* protected areas publicly available and prohibiting all new mineral activities in these proposed areas. This is done in the United States, where new mining activities are prohibited in river corridors *proposed* for protection as National Wild and Scenic Rivers (Ref. 17). By placing boundaries of proposed protected areas on the mineral license map of Mongolia and enforcing a moratorium on issuance of mineral licenses in these proposed areas, many conflicts between mineral licenses and protected areas would never arise in the first place. Such action would prevent numerous

future conflicts between protected areas and mining, and would also prevent speculation in mineral licenses in proposed protected areas in hopes of receiving government compensation and dispensations.

Recommendations

- Immediately prohibit issuance of exploration and extraction licenses in special protected areas, as required by Mongolian law, and withdraw all licenses issued in violation of the law.
- Prohibit issuance of exploration and extraction licenses in *proposed* special protected areas, and place boundaries of proposed protected areas on all government mineral license maps.
- Hold mineral exploration and extraction activities legally operating within special protected areas to far higher environmental standards than for mines operating outside special protected areas, as determined on a case by case basis.
- Hold mines operating in special protected areas responsible for paying all costs of environmental monitoring, including the cost of an on site inspector's salary.
- Promote land trades for mineral licenses on unprotected lands in combination with special dispensations as the ideal way of eliminating mineral licenses within special protected areas.
- Limit future geologic exploration in special protected areas to non-commercial research for the public record conducted by publicly funded agencies, such as universities, research institutes, or the Mongolian Geological Survey.
- Prohibit all transfer between companies of mineral licenses located in special protected areas.
- Immediately grant protected status to all lapsed mineral exploration and mining license areas within special protected areas.
- Require submission of seasonal prospecting, exploration, and mining work plans to relevant local authorities, special protected area officials, and the Ministry of Nature and the Environment for all legal mineral activities conducted in special protected areas and their buffer zones. Work plans should describe all intended work in protected areas and their buffer zones and the schedule for this work. Require mineral license holders to give advanced notice of all changes of activities and scheduling in submitted work plans.
- Permit authorities to prohibit mineral activities on valid license areas within special protected areas if the proposed mineral activities will be detrimental to the goals for which the protected area was established.
- Place a permanent ban on all future mining and surface disturbing exploration in core or pristine zones of special protected areas.

- Increase fines for violation of environmental statutes by the mining industry to be commensurate with the profit being generated and the cost to repair the damage done.
- Create a pamphlet specifically to describe the environmental obligations of the mining industry, including regulations concerning mineral activities in special protected areas and their buffer zones, which can be distributed with mineral license applications.
- Do not even consider granting mining licenses in a special protected area unless the revenues generated will benefit the national economy on a level comparable to that of the Erdenet Copper Mine.
- Create a mechanism to mandate the automatic exchange between the Ministry of Nature and the Environment and the Mineral Resources Authority of Mongolia of all revisions to the Special Protected Areas Map of Mongolia and the Mineral License Map of Mongolia.

Conclusions

At the present time the government of Mongolia is highly dependent on revenue generated from the mining industry to support the nation during the current transition to a free market economy. The stability of Mongolia's economy will continue to be highly dependent on the mining industry for the foreseeable future. However it must be recognized that the present race to find and extract Mongolia's mineral wealth will only provide a one time economic windfall with temporary benefits to the nation.

Yet at the same time the mining industry poses a severe threat to the ecological integrity of many areas of Mongolia, including Mongolia's system of special protected areas. Present enforcement of existing environmental legislation concerning the mining industry is inadequate, most mines fail to completely meet their environmental obligations, and a number of mines operate in or prevent the creation of special protected areas. In the process many of Mongolia's most important environmental and cultural resources are being damaged or destroyed by mining.

Mongolia's special protected areas are established to preserve the nation's environmental and cultural resources for all present and future generations of Mongolians, and could be a model for nature conservation the world over. It is imperative that the values of Mongolia's unique environmental and cultural resources be recognized, and that the long term benefits of many of these resources in their undisturbed state far exceeds the short term wealth that may be gained through their destruction by mining activities. While the discovery of a mineral deposit of "Erdenet" proportions within a special protected area may have to be developed for the sake of stabilizing the national economy, it must be kept in mind that such actions should only be considered under rare circumstances, and only with the agreement of *all* relevant government authorities.

Conflicts between the mining industry and Mongolia's special protected area system will continue to increase in the near future. In some cases the cost to repair ecological damage to special protected areas caused by mining may exceed the economic benefits derived from the mine. However before engaging in mining activities in protected areas, the short term economic benefits to be gained from these mines must be evaluated with respect to the long term benefits Mongolia's environmental and cultural resources can provide in their undisturbed state. Through adequate appraisal of environmental and cultural resources, enforcement of existing environmental legislation, and proper environmental planning, rational decisions can be made to derive the maximum benefit from Mongolia's resources for all of its people.

When mineral exploration and extraction is permitted in a protected area, the area effectively ceases to be protected, and such "mined out" special protected areas will hold little attraction for the millions of affluent foreign tourists who go abroad each year to experience pristine wilderness. In a world where wild places are rapidly disappearing, from the Himalayas to the Serengeti to the Amazon, preservation of Mongolia's wilderness and wildlife may be the key to its future economic and environmental well being.

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Regulation: SOR/78-213
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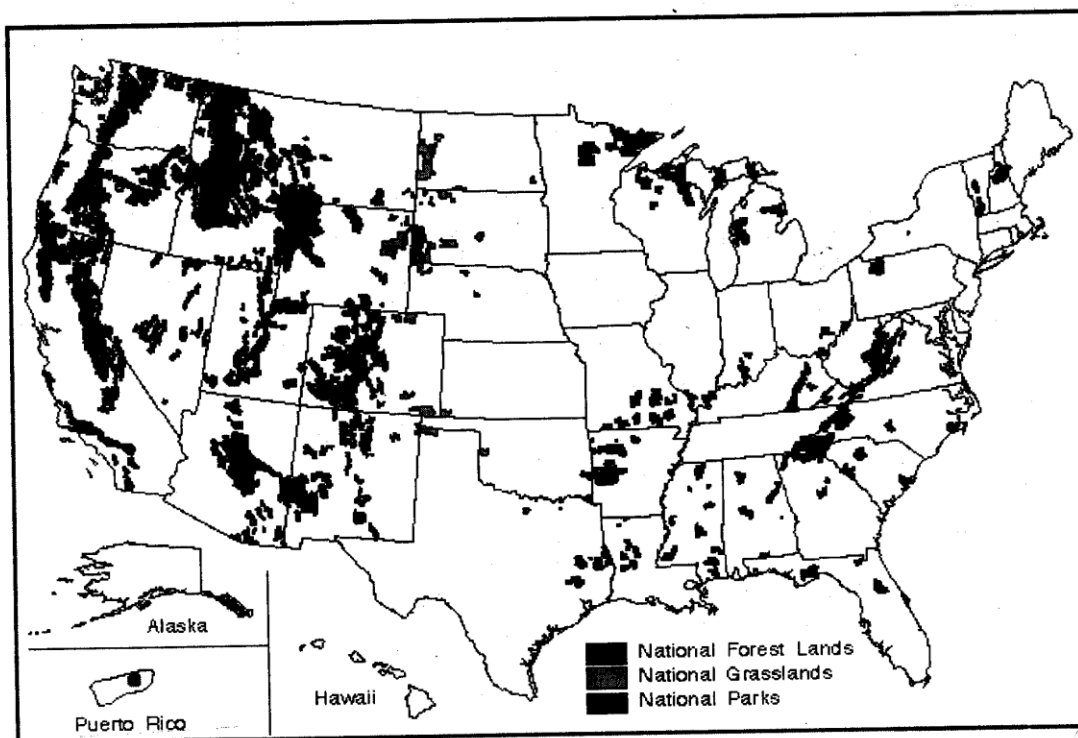
Appendix A:

Western Mineral License Terminology and the Approximate Mongolian Equivalents.

Region	Mongolian Prospector's Registration	Mongolian Exploration License	Mongolian Mining License
United States	none	Claim site occupation in combination with active exploration work.	Locatable Mineral Claim
British Columbia	Free Miner's Certificate	Mineral Claim	Mineral Lease
Western Australia	Miner's Right	Exploration License	Mineral Lease

Appendix B:

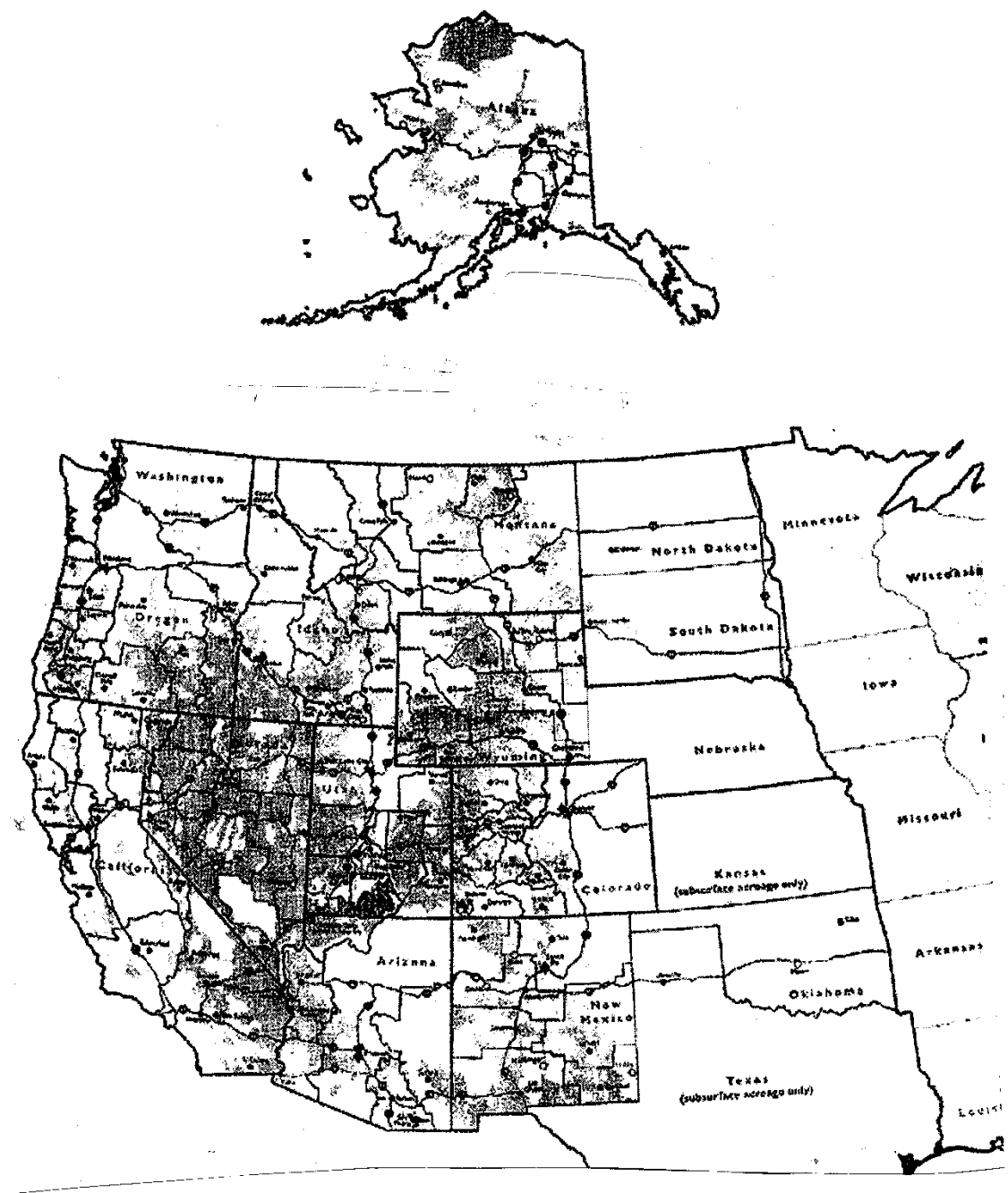
Special Protected Area Maps



Map 1: United States National Parks, National Forests, and National Grasslands.

Source: National Forest Service.

<http://www.fs.fed.us/recreation/maps.html>



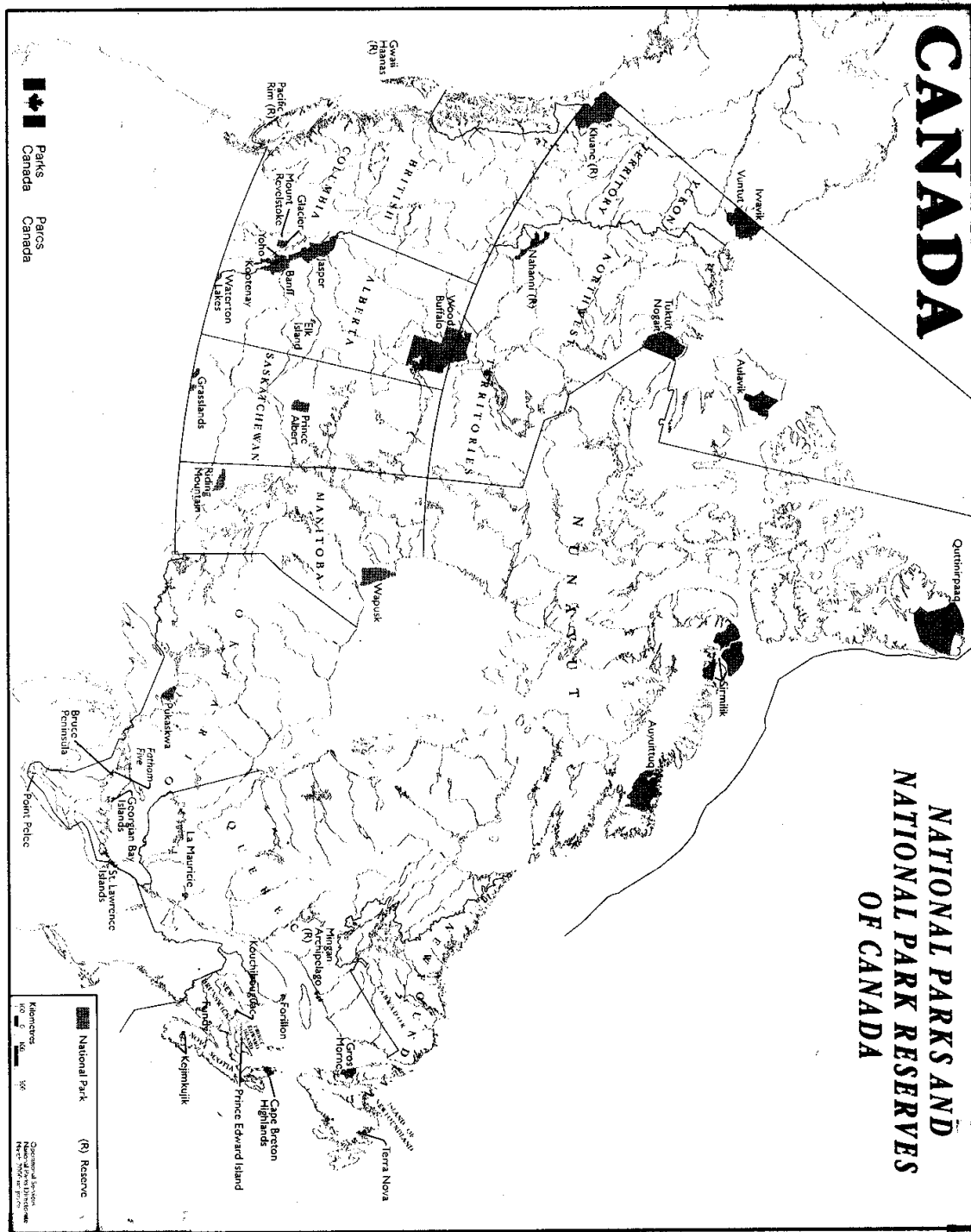
Map 2: Lands managed by the United States Bureau of Land Management (shaded).

Source: Bureau of Land Management.

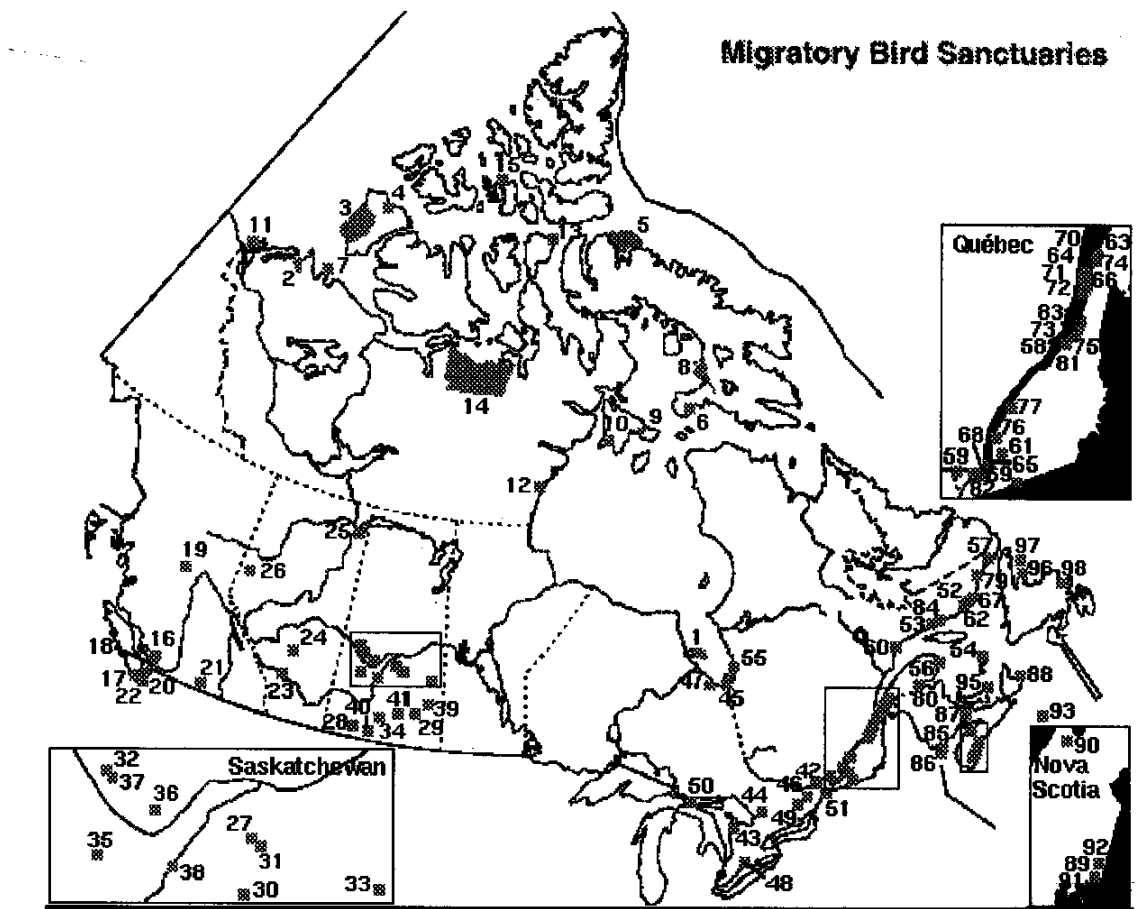
http://www.blm.gov/nhp/facts/maps/landsmapi_m.gif



Map 3: Approximate Location of the New World Mine Site, Montana, USA, adjacent to Yellowstone National Park.



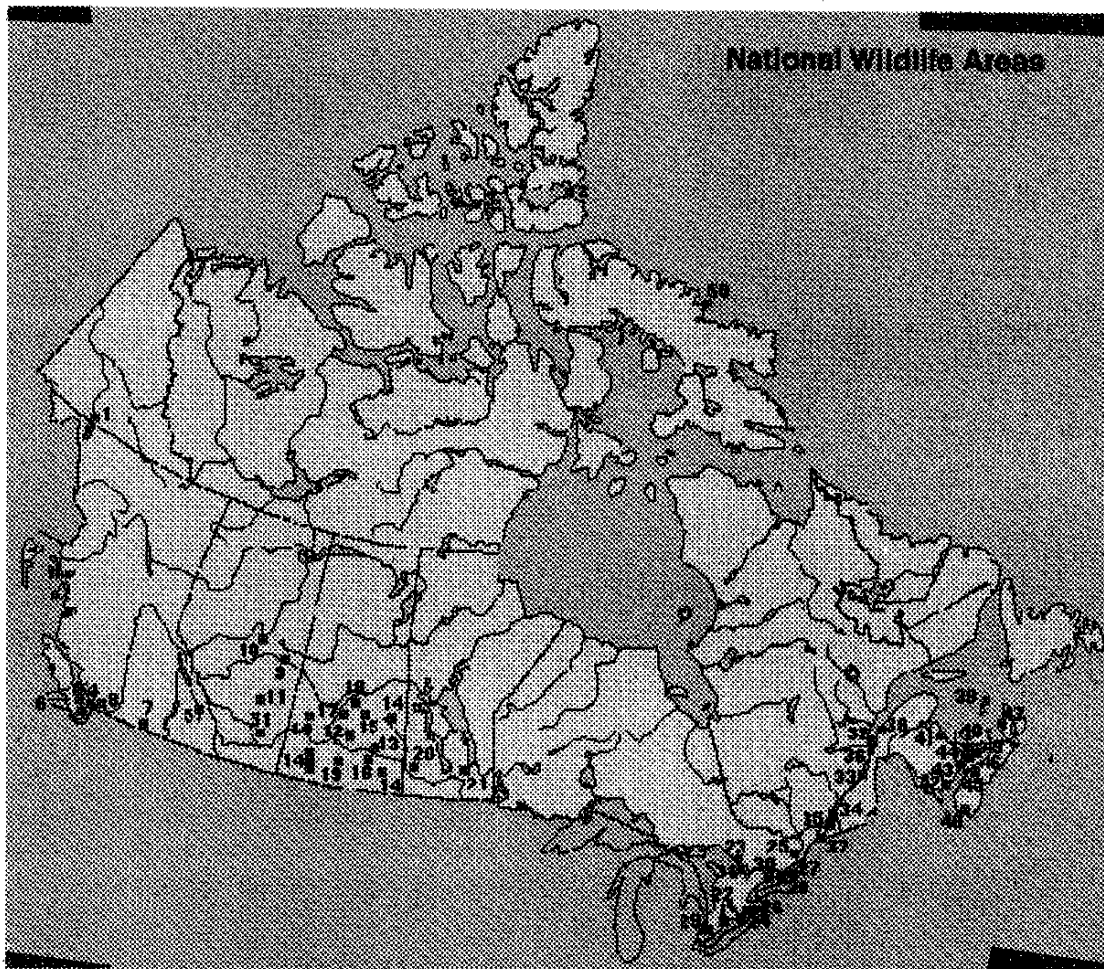
Map 4: The Canadian National Park System.
 Source: Parks Canada.
<http://parkscanada.pch.gc.ca/parks/reserves/e.htm>



Map 5: The Canadian Migratory Bird Sanctuary System (numbered).

Source: Canadian Wildlife Service.

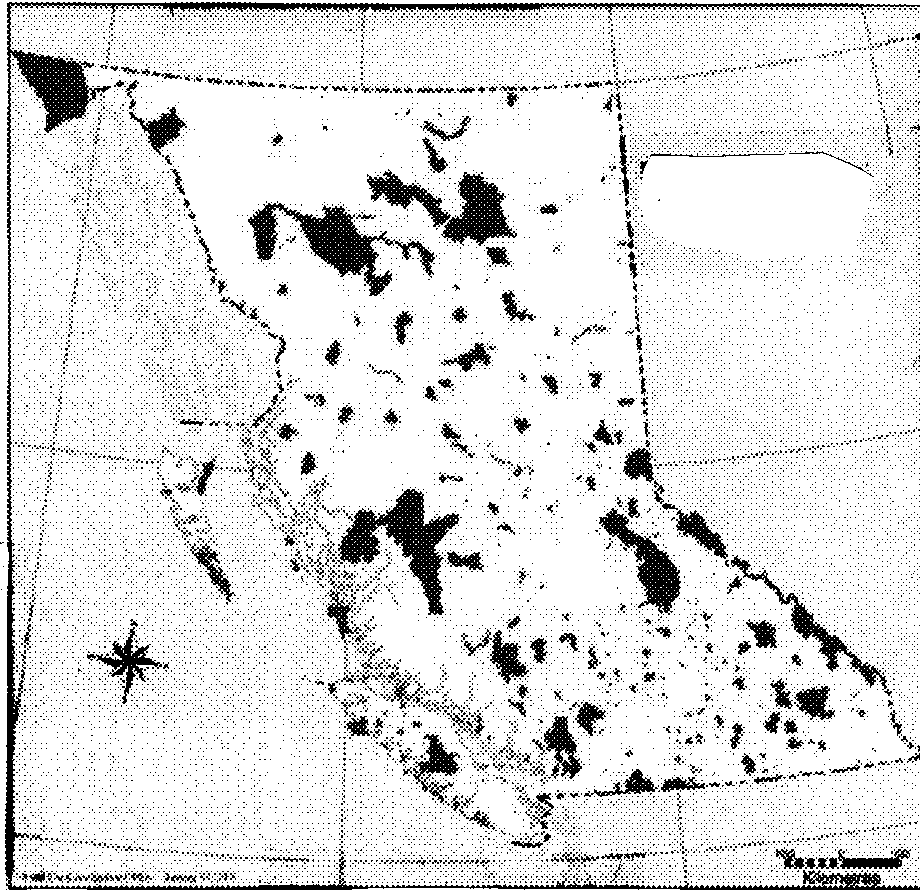
<http://www.cws-scf.ec.gc.ca/hww-fap/nwambs/listmbss.htm>



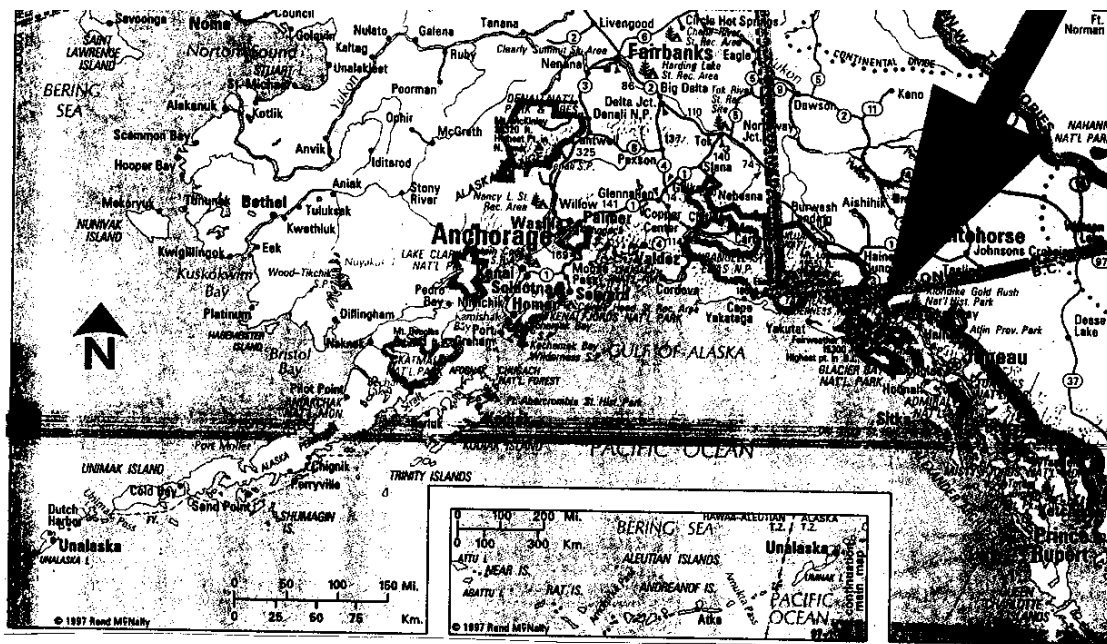
Map 6: The Canadian National Wildlife Area System (numbered).

Source: Canadian Wildlife Service.

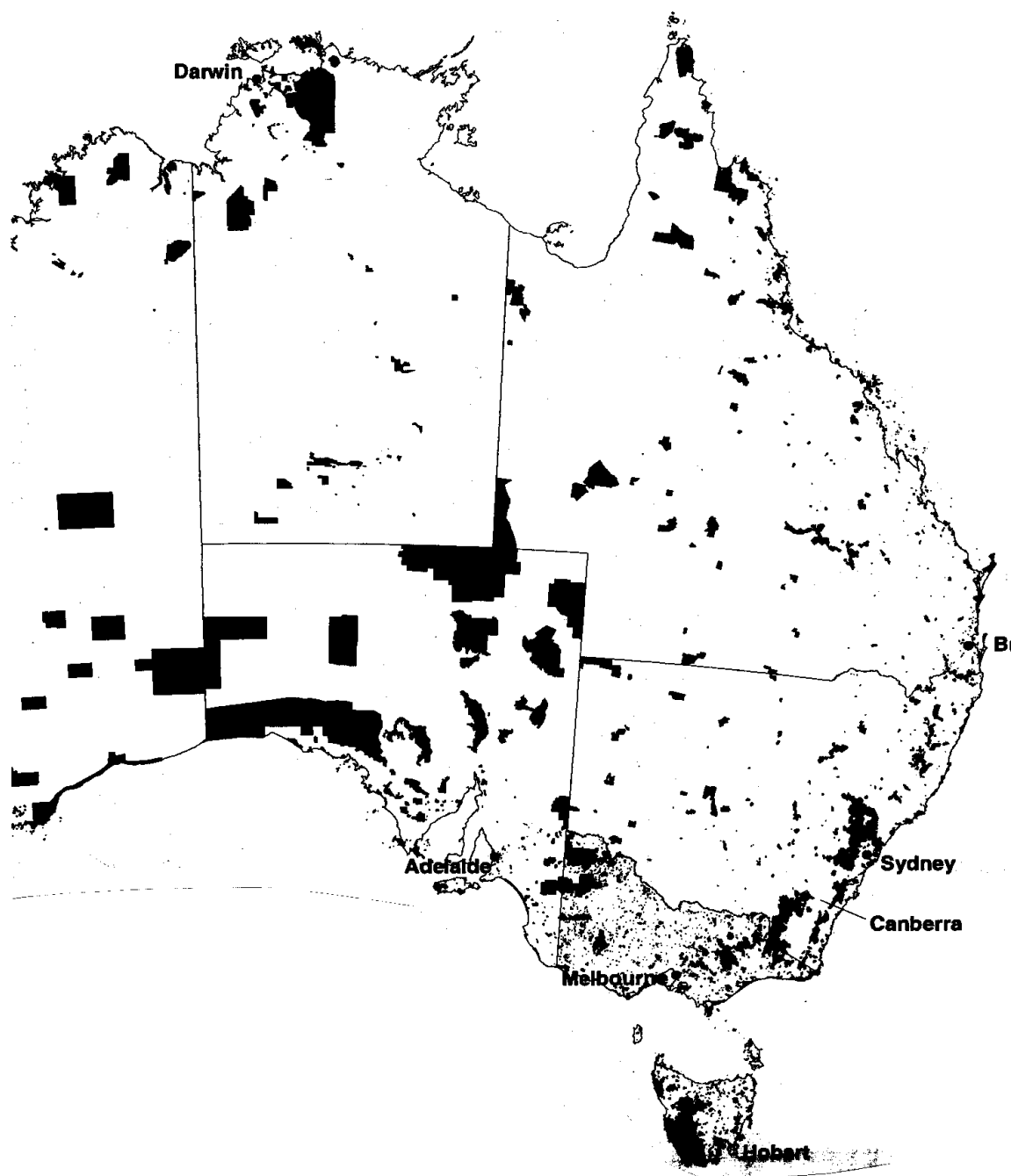
<http://www.cws-scf.ec.gc.ca/hww-fap/nwambs/listnwas.htm>



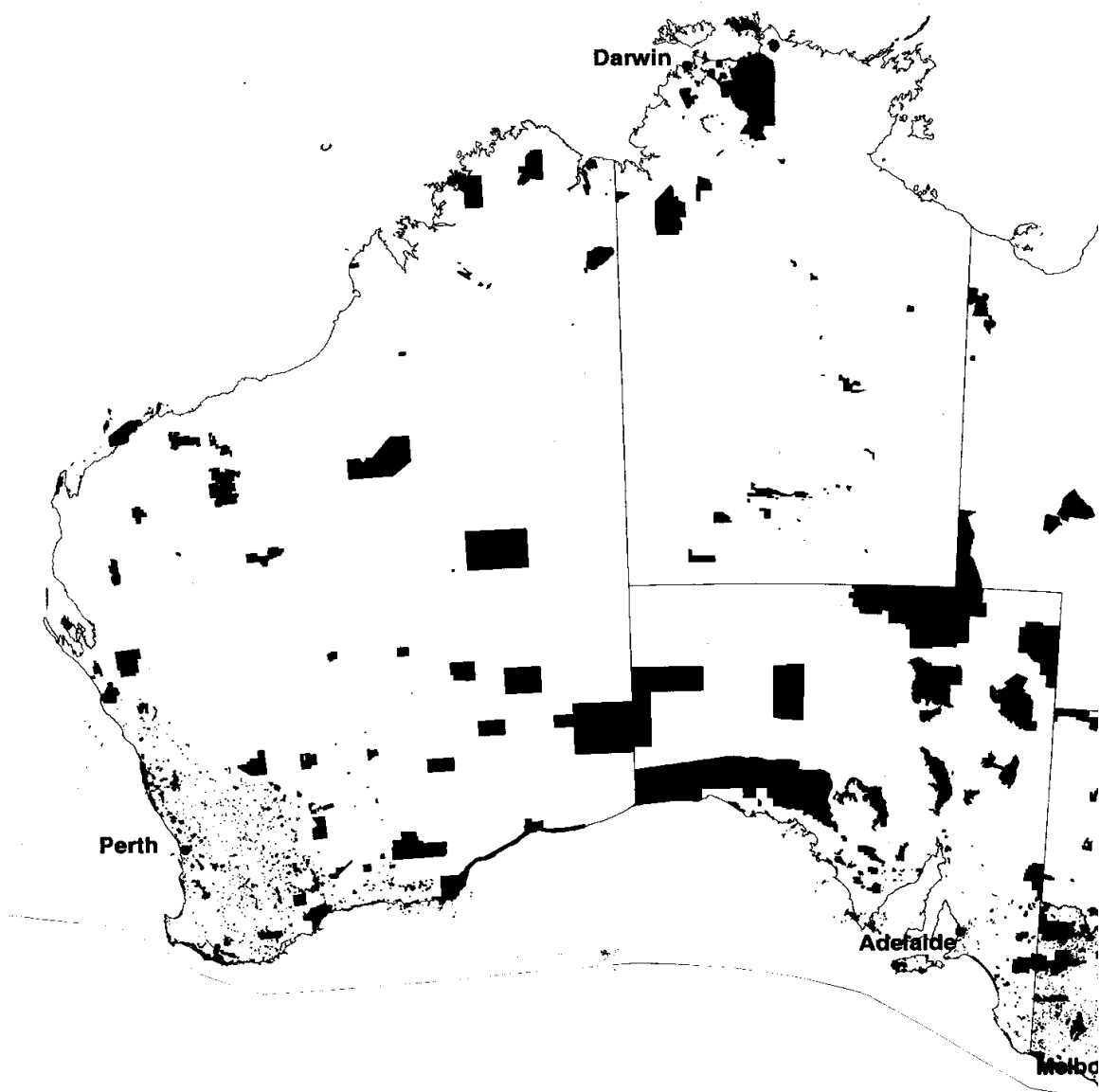
Map 7: The British Columbia Provincial Special Protected Area System (shaded).
Source: British Columbia Land Use Coordination Office.
<http://www.luco.gov.bc/pas/maps.htm>



Map 8: Approximate Location of the Windy-Craggy Mine Site, British Columbia, Canada, inside the Tatshenshini-Alsek Wilderness Provincial Park.

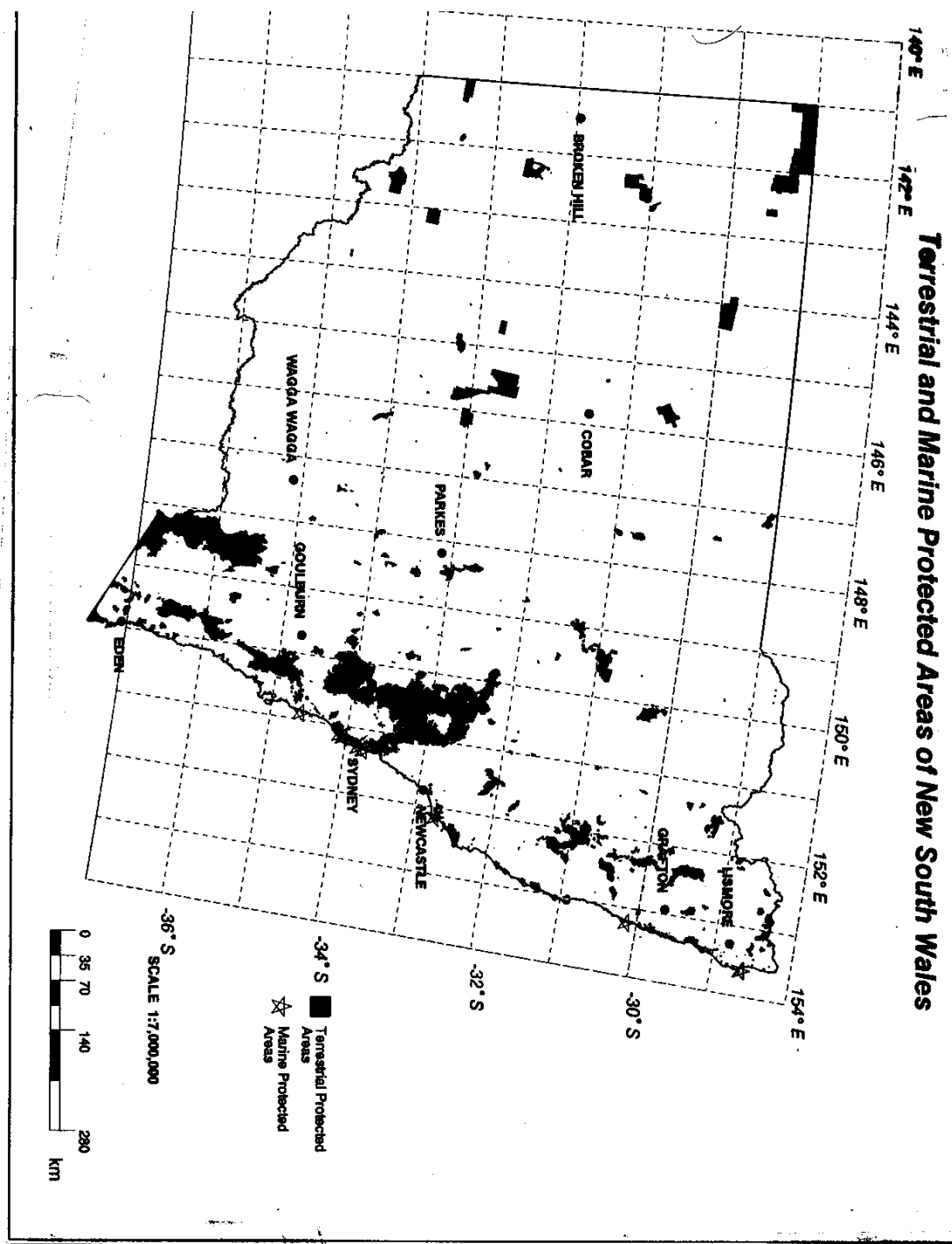


Map 9A: Special Protected Areas of Australia (shaded).
Source: Ref. 70, Cresswell, I.D. and G.M. Thomas, 1997. *Terrestrial and Marine Protected Areas in Australia*.

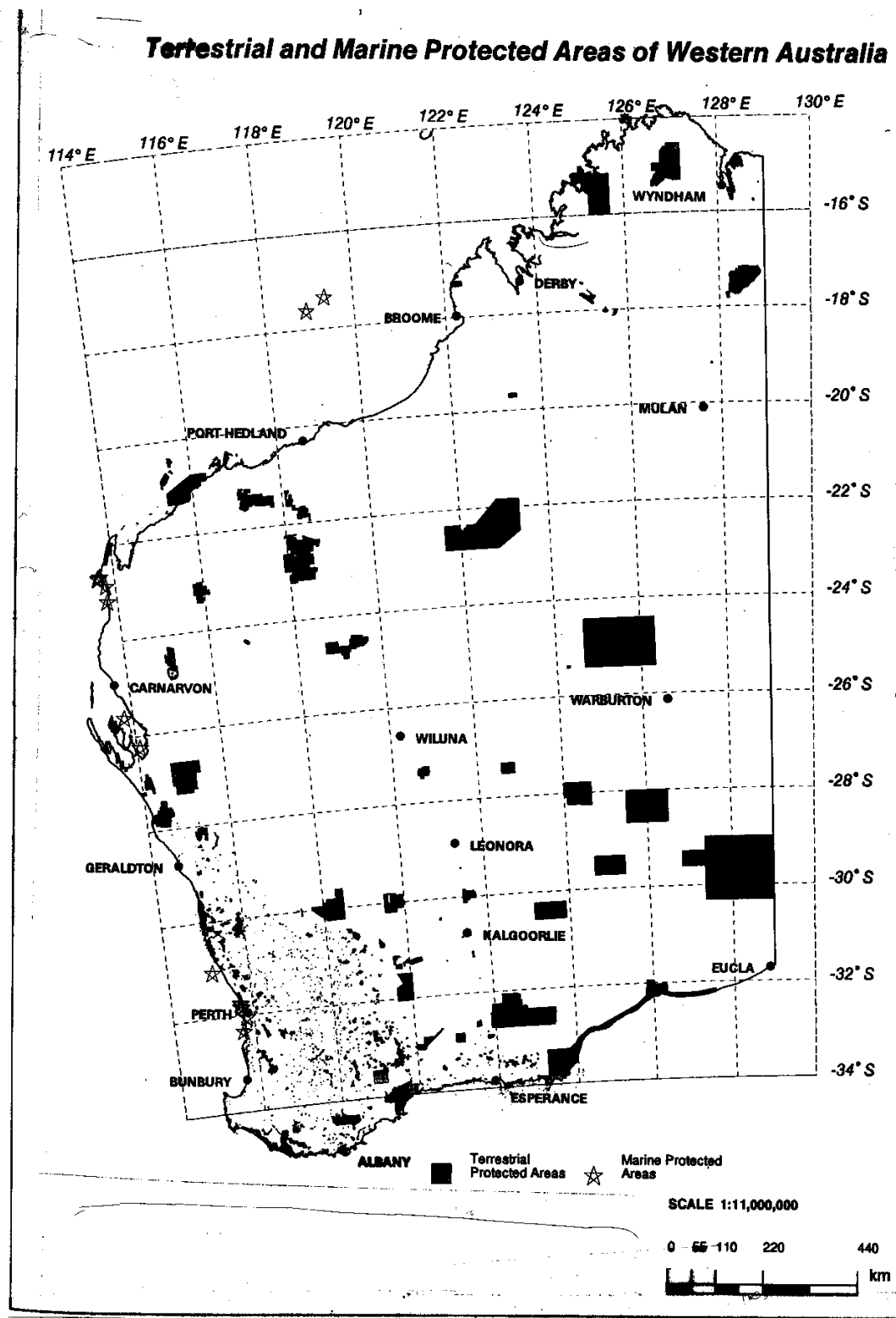


Map 9B: Special Protected Areas of Australia (shaded).

Source: Ref. 70, Cresswell, I.D. and G.M. Thomas, 1997. *Terrestrial and Marine Protected Areas in Australia*.

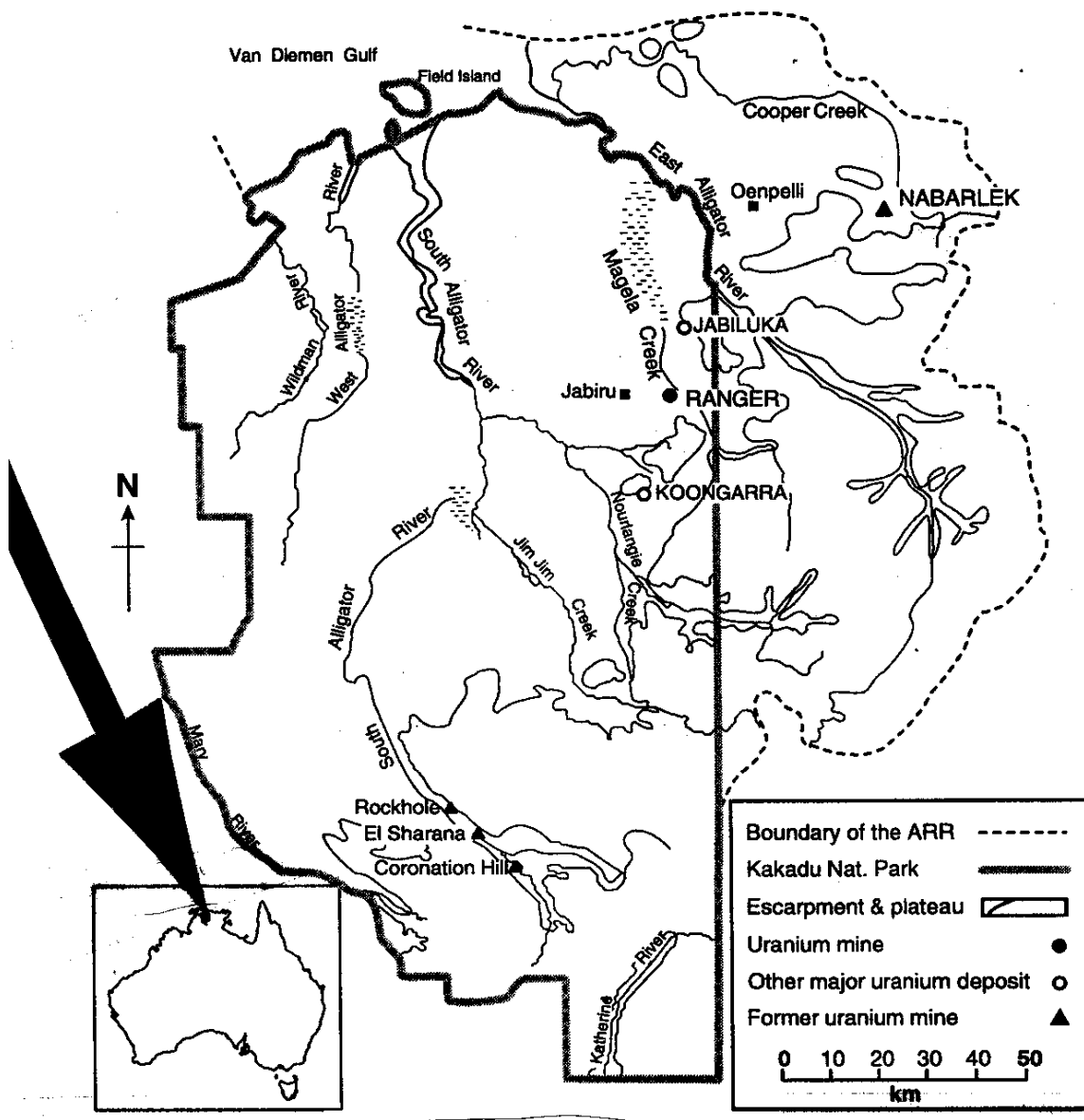


Map 10: Special Protected Areas of New South Wales, Australia.
 Source: Ref. 70, Cresswell, I.D. and G.M. Thomas, 1997. *Terrestrial and Marine Protected Areas in Australia.*



Map 11: Special Protected Areas of Western Australia.

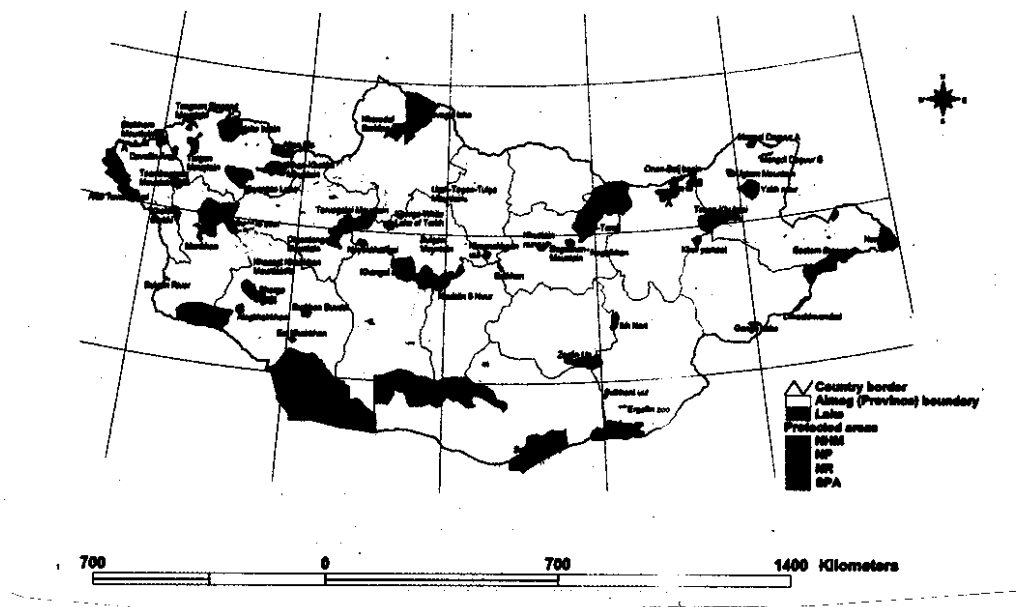
Source: Ref. 70, Cresswell, I.D. and G.M. Thomas, 1997. *Terrestrial and Marine Protected Areas in Australia*.



Map 12: Locations of the Ranger and Jabiluka Mine Sites, Northern Territory, Australia, inside Kakadu National Park.

Source: Ref. 87, Johnston, A. and R.S. Needham, 1999. *Protection of the Environment near the Ranger Uranium Mine.*

Special Protected Areas of Mongolia



Map 13: Special Protected Areas of Mongolia.

Source: Ref. 3, Enebish, D. and D. Myagmarsuren, 2000. *Special Protected Areas of Mongolia*.



Map 14: Location of the Zaamar Gold Mining District, Zaamar Soum, Tov Aimag, Mongolia.

Source: *Physical map of Mongolia*. State Administration of Geodesy and Cartography of Mongolia. Ulaanbaatar.